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NOTE ON THE DEVELOPMENT OF CHROMOGENIC ORGANISMS IN DRY RAW RUBBER ALLOWED TO BECOME DAMP.

By B. J. Eaton.

COMPLAINTS have been received from time to time by managers of rubber estates, from brokers or agents in London or other rubber buying centres, that rubber has been received from the estate which is affected with "spot disease," although according to the manager in each case, the rubber left the estate perfectly dry and free from "spot disease." Several instances of this have been brought to the notice of the Department of Agriculture and when visiting an estate about a month ago the writer was asked by the manager to give a written opinion as to the possibility of "spot diseases" affecting the rubber after it had left the estate in a perfectly dry clean condition, since, in this particular case, the estate rubber was sent to Malacca and shipped from that port. It is well known that transport of goods, etc., at Malacca from the shore to the ship has to be carried out in lighters or sampans, and, especially in rough weather, the sea water may come into contact with cases of rubber. From previous experience the opinion was given that the development of "spot disease" due to the growth of chromogenic organisms in the rubber, owing to the rubber becoming wetted, either by rain or sea water, was highly probable.

Experimental.

In order to prove definitely, however, that such development of chromogenic organisms can and does occur in perfectly dry clean pale crepe, owing to the rubber coming into contact with water subsequently, a piece of thin crepe was dipped into water for about five minutes, taken out and thoroughly shaken to remove as much of the adhering surface moisture as possible and then rolled into a cylinder by hand in order to retain the moisture and imitate the conditions existing in a case of such rubber.

After about ten days considerable development of chromogenic organisms occurred and the rubber is now coloured with patches of orange, blue and yellow.

A second piece of the same crepe was allowed to soak for several days in water and then removed, shaken and rolled in a similar manner when the same development of chromogenic organisms took place.

These experiments prove definitely that rubber may leave an estate in a perfect condition and subsequently arrive home in a bad condition due to carelessness or accidents at the shipping port. It is even possible that such chromogenic organisms or their spores, present in dry rubber, may survive the voyage of four to six weeks and may develop after the rubber reaches port in Europe or America, if the rubber subsequently becomes damp. It would be of interest if rubber chemists or other scientific officials in London or elsewhere would repeat these experiments and report as to the results. In winter the rubber after soaking in water would probably require incubation at about 85° Fah. to correspond with our shade temperature here, otherwise the organisms may not develop at a lower temperature.

It is also interesting to note that dry well-smoked sheet rubber may develop mildew on the surface for similar reasons, while low grade rubbers may ferment and become tacky. With regard to the development of chromogenic organisms in rubber as shown by the development of pigment, several interesting observations have been made recently by the writer, while experimenting on the influence of the rate of drying of rubber on the rate of vulcanization.

In the first place, no development of pigment occurs in "slab" rubber—*i.e.*, slightly pressed coagulum, until the slab is cut open later, when pigment develops on the cut surface after a few days. Secondly, if sheet rubber is rolled into a cylinder straight from the sheeting machine, no development of pigment takes place till the sheet is cut open, when pigment develops on the cut surface. When wet thin crepe, on the other hand, is rolled into a cylinder, there is invariably a great production of pigment due to the growth of these chromogenic organisms. It would appear from these experiments that the presence of air is therefore necessary for the development of the organisms or for the formation of the pigments and this is excluded in rolled sheet or "slab" rubber. Also it is probable that an excess of moisture may retard or prevent the formation of the pigment, and that the pigment forms later when the moisture content is somewhat reduced. Another interesting fact observed is that the pigment, due to the growth of the organisms, develops far more readily in thin crepe which is converted to thick or blanket crepe while still wet, than in original thick crepe, which has not first been rolled thin, even though the original thick crepe may have a higher moisture content when freshly manufactured than the blanketed thin

crepe. This is due to the fact that the original thick crepe, being softer and probably more porous, loses its moisture at a much greater rate than thin crepe which is blanketed while still wet, due to the hardness of the latter when rolled thick. Owing to the faster rate of drying of the original thick crepe, the moisture content is reduced to too low an amount to admit of a marked development of the organisms which cause the pigmentation of the rubber.

It also appears probable, although the problem has not yet been studied sufficiently, that these organisms act on the protein or protein decomposition products and destroy the accelerating agent formed in the rubber during the first six or seven days of drying or produce a further cleavage of these substances. In any case no further change causing acceleration in rate of cure takes place in thin crepe which is rolled into a cylinder while still wet, that is, immediately it is taken from the machine, while a slight acceleration in rate of cure is produced by blanketing similar thin wet crepe. This effect again confirms the idea that the decomposition of the proteins producing acceleration in rate of cure is due to anaerobic processes, which do not take place in the rolled crepe, owing to the comparatively large amount of air between the layers of crepe when rolled together in a cylinder by hand, while a slight but definite acceleration in rate of cure is produced by blanketing thin wet crepe.

It is hoped that this note will be of use to planters who may receive complaints as to "spotting" of rubber from their brokers at Home. As far as the writer is aware, no observations on the spotting of dry rubber, owing to its becoming damp subsequently, have been published.

For further information on "spot diseases" of plantation rubber, reference should be made to Bulletin No. 19, by A. Sharples, published by the Department of Agriculture.

PREVENTIVE MEASURES AGAINST BLACK THREAD.

(Phytophthora Faberi.)

By H. C. Pratt.

(General Rubber Company.)

THE following is a short preliminary note on Black Thread. It is published as it is thought it may be useful to the planting community.

The Disease and its Effects.

Black Thread, or Stripe Canker, or Cambium-rot, as this disease is variously called, was known to attack Hevea over a decade ago. It has been studied sporadically by several investigators, but no practical satisfactory remedy has to my knowledge been discovered. By some people this disease of Hevea is not regarded in a serious light, but in some countries, and on some plantations, there can be no two opinions as to its dangerous nature if allowed to progress unhampered. It has been aptly said that in the first 30 inches of basal bark lie the assets of a rubber company. This disease confines its attacks in the main to these 30 inches. It is a wound parasite attacking the delicate tissue exposed through tapping.

The activity of *Phytophthora* on the tapping surface usually produces straight black vertical lines. These are visible only after the outer layers of this bark are cut away. Later on as these develop the disease shows itself in the same form on the outside of the tree.

In bad cases, individual black lines are not apparent, the whole of the tapping surface for an inch or more above the tapping cut turning black, causing the death of the affected functioning tissue. Large wounds are thus formed. These should be treated by scraping away the *dead* bark and subsequently covering the exposed surface with a wound paint. The wood even though discoloured and dead need not be touched.

The successful progress of the disease is dependent upon wet weather and upon tapping. With a cessation of tapping, the progress of the disease is checked, and certain estates have adopted this means to prevent its progress during the rainy season. It is an unnecessary and expensive remedy.

Apart from the death of large areas of the tapping surface which Black Thread is capable of causing, it not uncommonly produces burrs. These burrs must be removed as they appear. It is also responsible for "fluted" renewals which render tapping a more difficult task than when the renewal is smooth.

Influences Favouring its Progress.

(1) Foremost amongst these is wet weather. This is essential. From the observations made, light rains accompanied by an overcast sky form ideal conditions. In dry weather the disease ceases.

(2) Rubber on flat land, especially when poorly drained, is very subject to attack.

(3) Dense shade in thickly planted areas favours the progress of this disease.

(4) The height of the cut from the ground. If below 20 inches, the percentage of trees affected in low damp places is high. In the same situations cuts above 20 inches are not affected to the same extent in Sumatra.

Remedial Measures.

For over a year, extensive experiments to combat Black Thread attacks have been conducted on an area of nearly 300 acres. For these experiments an area where Black Thread was very prevalent was chosen. Figures on these experiments are not yet complete, but some of the results were so satisfactory that it was considered justifiable to apply some three months ago over 24,000 acres the method outlined below. The figures for 12 experiments are given here. The period of treatment was, approximately, two months at the time the last percentages were taken.

Expt. No.	Fungicide.	No. of times applied.	Original per cent. of trees attacked.	Present per cent. of trees attacked.	Trees in tapping.
1	Carbolineum 1 in 5	Every day ...	44.25	18.24	315
2	" "	" second day	15.81	15.81	251
3	" "	" third day ...	16.53	36.53	284
4	" "	" fourth day	7.38	20.80	271
5	Control	...	18.07	50.20	249
6	"	...	2.14	21.70	280
7	Carbolineum 1 in 5	Every day ...	26.38	6.27	288
8	" "	" second day	14.80	8.09	304
9	" "	" third day ...	22.33	16.37	282
10	" "	" fourth day	21.15	15.44	260
11	Control	...	30.33	42.33	300
12	"	...	17.68	37.90	278

One of the marked features in these experiments was the lightness of the attack where daily disinfection was adopted. It was difficult to detect the disease, in fact it was necessary to tap the trees at the time the census was taken to discover the disease. It makes no progress. On the other hand, in the controls the disease was very marked. In these experiments every day treatment is obviously the only effective one. Experiments were also conducted with Izal, which is the fungicide now used over 24,000 acres. It is not quite as satisfactory as Carbolineum, but it is a good fungicide and is available. Izal at a strength of one in five burns the delicate tissue exposed on the tapping surface, and the strength which has proved satisfactory is one part of Izal to 10 parts of water.

Portable receptacles for the solution may be made from bamboo. Pieces about 10 inches long with two joints are best. The transverse

portion (the inner part) of one of the joints is removed. This is a practical and cheap vessel for the transport, in the field, of the fungicide. It is applied with a brush made of rotan. Eighteen inches is a convenient length. About an inch of one end of the rotar is well crushed between two stones or in any other convenient way This end is used to apply the liquid to the tree.

The method of application, if done at the time of collection, is as follows: The bamboo receptacle with the fungicide is attached with string or wire to the latex can. The brush is placed within the bamboo container. After the cup of latex has been emptied into the collecting can, the brush is drawn once along the entire length of the tapping cut beginning at the higher end. The time of application—*i.e.*, whether in the morning or afternoon, does not make any material difference to the effect, and estates which apply this treatment can suit their convenience in this respect. If the disinfection takes place at the time the latex is collected, the part of the can to which the bamboo container is attached must be nearest the tree. If this is not done, and the brush is continually lifted over the top of the can, drops of Izal fall from the brush into the collected latex causing it to coagulate. Izal, however, has no deleterious effect upon the scrap rubber.

To disinfect 600 trees at the time of collection delays the tapper on an average half an hour. Some tappers, in fact quite a number, require only an extra 15 minutes when accustomed to applying the fungicide, but it is better to allow half an hour so as to ensure more careful work. At first fully an hour must be allowed.

Dr. Rutgers, Director of Experiment Station of the Rubber Planters of the East Coast of Sumatra, has issued a circular to Sumatra Rubber Planters in which he adopts this method of attacking Black Thread.

(The work published above is of considerable interest in showing how this disease is dealt with in Sumatra. Recently two outbreaks of "Bark disease" have attracted attention in the Federated Malay States. One form is the typical "Black Thread" or "Stripe Canker," the treatment of which is discussed above, the other form appears to correspond to the bad cases in "which individual black lines are not apparent, the whole of the tapping cut turning black." In the Federated Malay States it appears that two fungi are at work, the essential differences are so marked between the two manifestations. Painting the diseased surfaces with "Brunolinum" has been tried in Malaya, but the percentage number of cases did not decrease to any great extent though the treated trees were not badly infected. The method outlined above is well-worthy of trial, but a large amount of experimental work is still necessary before a final pronouncement on the best method of combating the disease in Malaya can be made. A. S.)

NOTES ON THE PREPARATION OF RAW RUBBER WITH SPECIAL REFERENCE TO "SLAB" RUBBER AND VARIABILITY.

By B. J. Eaton.

THE following questions have been raised on several occasions in connection with the preparation of what has been termed by the writer "slab" rubber—*i.e.*, unpressed or lightly pressed or rolled coagulum.

(1) Does the preparation of this type of rubber lead to greater variability or uniformity—*i.e.*, is it a solution of the problem of uniformity?

(2) Is "slab" rubber, apart from the advantage to manufacturers of its rapidity of cure, of better quality than other first grade types?

(3) Will difficulties arise in the manufactories in Europe, America, etc., in connection with the use of this type of rubber and are those difficulties likely to be greater than those which exist at present with the present types of first latex plantation rubber?

(4) In what form should such rubber be shipped, having in view the question of extra freight on wet rubber?

Question 1.—With regard to the first of these questions, the writer would state as his opinion that the preparation of this type of rubber will tend to greater uniformity than exists at present. It must have been realized by those who have followed the researches which have been carried out during the last two years that the variability in rate of cure, in our experimental samples, if "slab" rubber is included, extends over a wider range than does the variability existing in the ordinary samples of smoked sheet and "first latex" crêpe prepared on estates and on that account, it may be considered that we are introducing a further factor in variability, which would be detrimental to the industry.

Although full details of all the estate samples examined have not yet been published, it can be stated here that the variability in rate of cure of smoked sheet, as ordinarily prepared on estates is from about $1\frac{1}{4}$ hours to $3\frac{1}{2}$ hours and in the case of "first latex" crêpe from about $2\frac{1}{4}$ to about 4 hours. It is obvious, therefore, that considerable variability exists in the ordinary samples which are placed on the market and this variability exists to the greatest extent in the case of sheet, as would be expected from the results of our researches. That is to say, although the variability appears to be nearly as great from the above extremes, for crêpe as for sheet, a much smaller number of samples of crêpe having the extreme rates of cure given are prepared than of the extreme samples of sheet.

It is now generally known among planters, that pale crêpe is largely used for specific purposes by manufacturers—*viz.*, for the manufacture of transparent or light coloured thin articles and, generally speaking, manufacturers who may use pale crêpe for other articles are doing so with a resultant loss of quality in the goods manufactured. There will, therefore, always be a demand for pale crêpe for the articles mentioned and the problem to be attacked in this connection is, therefore, whether a pale crêpe can be manufactured from coagulum kept for about six or seven days before being crêped, if it is desirable to produce a pale rubber having a rapid rate of cure and better physical properties combined with lightness of colour.

It is not improbable that such a rubber can be manufactured on estates, by keeping the coagulum in air-tight vessels and by subsequent soaking in sodium bisulphite solution before or immediately after crepeing.

Putting aside however the preparation of pale crêpe, which may be considered, from the point of view of its uses, a special preparation, it is proposed to substitute "slab" rubber for sheet, so that variability has to be considered principally from the point of view of slab and sheet.

We have shown that the cause of variability in rate of cure is due chiefly to biological agencies, acting on the protein constituents of the rubber, producing substances of the nature of amines or amino acids which act as vulcanization accelerators and that numerous variable factors in methods of preparation affect the amount of such accelerators which are formed. It is obvious, therefore, that the more variable factors are introduced, the greater will be the variability of the product and the writer's contention is that greater variability is introduced in sheet than would be in slab rubber, which undergoes the minimum of handling. One of the greatest factors responsible for variability in rate of cure of sheet rubber is the rate of drying (including smoking) and, secondly, the concentration of the latex and the amount of rolling. In the preparation of slab the first two variables are considerably decreased for the following reasons:

(*a*) Provided the moisture content is above a certain limit during the first six days of drying, the rate of cure is not affected. Thus coagulum removed from the serum and allowed to drain only, does not cure more rapidly than lightly hand rolled coagulum and this, as the writer will show shortly from many experiments hitherto unpublished, is due to the fact that the latter does not dry during the six day period to a greater extent than the former.

(*b*) Beyond certain limits concentration has very little effect in slab, since sufficient accelerator is formed in slab rubber to effect the maximum rate of cure obtainable. Again, variable concentration of latex will influence the

rate of cure of sheet, as much, if not more, than that of slab. Similar standardisation of latex to a constant density can be carried out on estates for slab as for sheet, thus eliminating this factor. The third variable factor (amount of rolling) is entirely eliminated.

Finally, since the primary cause of variability in rate of cure is biological, it may be thought that considerable variability would be caused by an uncontrolled fermentation or decomposition, such as occurs in the coagulum. It should be remembered, however, that in this country, the shade temperature is very constant during the day and this constancy, in the writer's opinion, is responsible for the remarkable uniformity of the change which takes place in unrolled coagulum left to mature for six days, together with the fact that the latex during collection is thoroughly exposed to numerous chance organisms which enter it. This remarkable uniformity of slab rubber has been proved by the writer, not only in all his experimental samples, which include many hundreds, but also in samples prepared on different estates in various parts of the country.

It must of course be understood that other variable factors, such as the use of mineral acid (*e.g.* sulphuric acid) coagulants, must not be introduced.

Question 2.—All our experiments have shown that the tensile properties of slab rubber are from 20 to 25 per cent. better than those of crêpe rubbers and generally superior to sheet rubbers and since sheet is superior to crêpe in general, it may almost certainly be argued that the keeping properties of vulcanized "slab" rubber will also be superior. This has been shown already by the writer and stated on several occasions at lectures delivered before various Planters' Associations in the country. In this connection I have stated that the superior tensile properties of "slab" rubber may be either an inherent quality of the raw rubber, or may be due to the much less prolonged heating that such rubber has to undergo during vulcanization to attain its optimum cure and maximum tensile properties.

There are thus two advantages in favour of "slab" rubber—*viz.*, rapidity of cure and superior tensile properties.

Question 3.—With regard to the third question, there is absolutely no reason why the preparation of slab rubber should cause greater confusion or difficulties for the manufacturer, than is caused by the variability in rate of cure which exists at present in the case of sheet and crêpe rubbers.

It may of course be extremely difficult for the broker to distinguish between the "slab" rubber, if marketed in the form of crêpe and ordinary slow curing "first latex" crêpe, or between the crêped "slab" and, say, lump crêpe, since both types are streaky, owing to surface oxidation. This is, however, the crux of the whole problem

with which we have to deal from the buying and selling point of view and the writer's contention in this respect, is that the sole basis of purchase of raw rubber should be its intrinsic value, and not its value, as judged by appearance by either the broker or manufacturer and every rubber chemist should endeavour to bring about this condition of affairs. There is also no reason why rubber, prepared as slab and marketed as crêpe, should not be labelled, if it is considered that any difficulty would arise among manufacturers. Briefly stated, such an argument against the marketing of "slab" rubber is not worth consideration by either scientific or practical men—the terms are used here in their common acceptance, since the scientific man in this connection must consider what is commonly termed the practice of an industry and the writer personally objects to the distinction suggested by the terms "scientific" and "practical". In confirmation of this opinion as to any confusion caused by the marketing of "slab" rubber, the writer has previously stated elsewhere, that a large American firm, which supplies its own factories in America, with raw rubber from its own estates, and is thus independent of the broker, manufactures rubber of this type and is apparently satisfied as to its superior quality and properties.

Question 4.—With regard to the fourth question, the problem is somewhat more complicated. There are, however, only three forms in which "slab" rubber could be placed on the market, as follows:

(*a*) In the form of virgin slab, containing about 20 per cent. of moisture.

(*b*) In the form of dry crêpe.

(*c*) In the form of block.

With regard to the first of these, the chief objections to shipping this type of rubber in its original form are that freight has to be paid on 20 per cent. of moisture and also that, owing to a possible variable moisture content, the value of the product is less easily judged. This latter objection also applies to Fine Hard Para and does not appear to cause any difficulties on the market.

With regard to the question of extra freight, due to the moisture present in the virgin slab, the question arises as to whether the extra freight on the rubber is greater or less than the extra cost involved in converting the slab to crêpe and drying it in this country before despatch; this cost of manufacture includes extra cost and depreciation on larger drying rooms than would be necessary for virgin slab, and cost and depreciation of machinery for conversion to crêpe. The writer hopes to collect figures in regard to this question shortly.

If "slab" rubber is converted to crêpe on the estate, the disadvantages are that (*a*) no saving in machinery is effected and it is probable that a rather heavier type of machinery will be required, since the "slab," after maturing for six days, is very tough, and secondly, drying space equivalent to that for ordinary "first latex"

crêpe is necessary, (*b*) it may be difficult for brokers and manufacturers to distinguish between this type of crêpe and the ordinary slow curing "first latex" crêpe. This difficulty, however, is easily surmounted by marking the cases, and, since no rubber should be sold on appearance only, which is no criterion of its real value, this disadvantage is not worth consideration, even from the so-called practical point of view.

The advantage in favour of converting "slab" to crêpe on the estate is that freight on moisture is eliminated.

It is doubtful, however, whether the advantage in favour of marketing this type of rubber in the form of crêpe is sufficient to neutralize the disadvantage of shipping virgin "slab."

The third form in which this type of rubber can be marketed is in the form of dry block manufactured from artificially dried crêpe. This point has been referred to in *Agricultural Bulletin*, Vol. IV, No. 3, December 1915, pp. 58—62, in connection with the preparation of block rubber on an estate in Malaya, where it was shown that the rubber thus prepared is of excellent quality and equal to ordinary slab converted to crêpe and air dried. The advantages of this form are (*a*) the rubber is dry; (*b*) after the six day maturation period, the raw rubber can be crêped, wormed and hot air or vacuum dried and blocked immediately, thus preparing it ready for the market in seven or eight days, and again saving the cost and upkeep of large drying sheds; (*c*) the blocks are very compact and convenient for shipping, since considerable shipping space is saved, compared with sheet or crêpe. The disabilities are (*a*) the raw rubber has to be crêped so that no saving in machinery on the estate is effected; (*b*) the cost of artificial drying which, however, would probably not be more than the cost of fuel for smoking sheet. At the present stage, however, no definite statement can be made as to which of the three forms will eventually prove the most satisfactory, although, in the writer's opinion, shipping in the form of virgin "slab" or dried block are preferable to conversion to crêpe on the estate and shipping as crêpe.

One other advantage in favour of shipping the virgin "slab" might be mentioned—*viz.*, saving effected in packing, since the "slab" need not be packed as carefully as smoked sheet and crêpe are packed at present.

I understand the company in question, which is shipping rubber of this type, pack the rubber in bags only.

It is hoped that these notes will stimulate further interest in a type of rubber which the writer is firmly convinced from his experimental work, is of considerably greater value than the types of plantation Para rubber at present on the market and also superior to Fine Hard Para. Remarks similar to the above have been made by the writer at various lectures during the last two years before District

Planters' Associations in this country, and it is thought desirable at this stage to publish these statements in order to bring the issues more clearly before both the producer and manufacturer and to stimulate further interest in a problem which is of great importance to the industry.

In connection with the lack of interest which is often taken in any new discovery, particularly on account of the fact that everyone prefers to carry on in the old way, I should like in conclusion to quote some remarks made by one of the leading chemists and scientists in Great Britain—the late Professor Raphael Meldola (who incidentally was the professor under whom I studied chemistry)—who over thirty years ago prophesied the decadence of the great dye industry in Great Britain and issued a warning to the country which, unfortunately, proved to be true and the realization and significance of which he lived sufficiently long to see, owing to the present condition of affairs, which have only too clearly demonstrated our reliance on German manufacturers due to German organization especially with regard to the organization of scientific research and the realization of its value.

The quotations are as follows: "In our national characteristic of being "practical" we are apt to become short-sighted in our manufacturing policy and to recognise only actualities, to the exclusion of the potentialities conferred upon a nation by a broader scientific culture." "The question of the cause of the decline of the British (dye-stuff) industry resolves itself into the question of the cause of the continental activity. The answer to this last question has been staring us broadly in the face for over thirty years. It is amazing that there should have ever been any doubt or any cause suggested than the true cause, which is RESEARCH, writ large! The foreign manufacturers knew what it meant and realized its importance, and they tapped the universities and technical high schools and they added research departments to their factories, while our manufacturers were taking no steps at all, or were calmly hugging themselves into a state of false security, based on the belief that the old order under which they had been prosperous was imperishable . . . we (the English chemists) were but a handful of light skirmishers against an army of trained legionaries."

It is not suggested that the rubber industry of Great Britain on the manufacturing side, is in the state of the dye or colour industry, but in our national characteristic of being "practical" we are far too prone to allow others to take advantage of any discoveries which may be of value or to put them aside as being unpractical without thoroughly testing them and to adopt a *laissez-faire* policy which is no longer of any use.

THE BETEL NUT INDUSTRY IN THE MUAR DISTRICT, JOHORE.

By H. H. Stirrup.

THE areca or betel palm (*Areca Catechu*) is a graceful tree with a straight unbranched stem reaching 40 or 50 feet in height and about 1½ feet in circumference, and bearing a crown of six to nine very large spreading pinnate fronds.

The fruit which is called the betel nut, is about the size of a hen's egg. It consists of a thick outer fibrous husk, inside which is the seed or nut. The nut itself is very hard and of a mottled grey and brown colour.

Although there are a large number of betel palms growing in the Muar district, the betel nut industry is now slowly dying out owing to the native preference for planting rubber. In spite of the fact that the trees are still bearing fruit, many owners are interplanting rubber between them and later cutting out the betel palms.

In very few cases are the betel nut plantations being run by the original owners or planters, who were mostly Malays. The commonest system is to hire out the betel plantation on contract to others, usually Chinese, who collect, prepare and sell the fruit.

Cultivation.—Only virgin jungle land is planted with betel nuts; the natives state that if any other land is planted, the palms have a poor growth and yield very little fruit. At the present time no new land is being planted; formerly, as soon as the palms ceased to yield more fruit, the land was abandoned and fresh jungle land cleared and planted.

The palms are usually planted about eight feet by eight feet on the square system. This gives about 680 trees to the acre. Very little weeding is ever done and there is always a fairly thick undergrowth of lalang, grass and other weeds. The land is never cultivated nor manured, in fact, the plantation is allowed to look after itself and the owner simply waits for the fruit to appear. The palms are usually healthy and pests and diseases have given no trouble up to the present.

The fruit.—When the palm is four to five years old it bears flowers and fruit, and continues to yield fruit for 15 to 20 years. As each leaf dies and falls off, it discloses a swollen leafy sheath in the axil. This sheath quickly ruptures and sets free the inflorescence which is composed of a large number of small palish flowers. The time required from the first appearance of the inflorescence to the ripe fruit is about six months.

The young palms bear from two to six bunches of fruit per year. The older palms only bear one or two bunches a year and finally no fruit at all. All the bunches of fruit do not appear simultaneously but young palms may have fruit and inflorescence in different stages at the same time. The fruits are collected when ripe.

Preparation.—The ripe fruit consists of a thick outer husk of coarse fibre and the nut itself in the centre. To prepare the betel nut for market it is necessary thoroughly to dry the fruit. It is very difficult to separate nut from husk when the fruit is newly gathered, but when dry, the husk comes away quite easily. The natives have various names for the finished product according to the method of preparation.

(*a*) *Pinang blah.*—To prepare this, an open space is first cleared of all grass, weeds, etc. Then the fruit is split into two halves with a "parang" * and laid out on this open space in the sun, split side uppermost. The splitting of the fruit is done by coolies, usually women, who get eight to ten cents per sackful. This wage also includes laying out in the sun, and a cooly who finishes three sacks in a day has worked hard for his 24 to 30 cents.

If the weather is fine, the outer husk can be separated from the nut quite easily in two to three days, but if the weather is dull or rainy, a day or two longer is necessary. "Kajangs" † are prepared and kept ready to cover the drying betel nut when it rains. If the nut is soaked with rain during the drying process, the value of the finished product decreases.

The nut is then separated from the husk and again put out in the sun to dry for three more days. The husk is thrown away or used as fuel by those who make "Pinang salai," a smoked preparation of betel nut. When the nuts are thoroughly dry, they are packed up in sacks and sold. Most of the betel nuts in the Muar district are made into "Pinang blah."

(*b*) *Pinang kossi.*—Instead of splitting the fruit, some people put the whole fruits in heaps to dry. These heaps are occasionally turned over to dry the fruit beneath. This method of drying requires very little labour but it takes about three months to dry the fruit sufficiently to enable the husk to be separated from the nut. When the husk has been separated, the nut is again dried in the sun for two or three days before it is ready. The natives call this product "Pinang kossi"; a lower price is obtained for this preparation than for "Pinang blah."

(*c*) *Pinang salai.*—This is a smoked preparation of betel nut. A kind of oven is first made of mud, usually about eight feet long by six feet broad and six feet high. The top of the oven is covered only

* A chopping knife.

† Mats made by stitching together the leaves of the screw-pine, and used to afford shelter from rain.

by a bamboo grating and the ripe betel nuts are put on the top of this grating. A fire is then made inside the oven with old betel nut husks. This smoulders and gives off a large quantity of smoke which escapes through the grating and thoroughly smokes the layer of betel nuts above. In about five days the betel nuts are removed and the husk easily separated from the nut. The nut is laid out in the sun for two more days and is then ready for market. A fair amount of "Pinang salai" is made in the Muar district and the finished product fetches the best prices.

(*d*) *Pinang asin.*—Sometimes the fruit is gathered before it is ripe—*i.e.*, whilst still green. This is mixed with salt, put into sacks and kept for two to three months. The natives call this "Pinang asin"; very little is made in the Muar district.

Yield and prices.—The average number of betel nuts in a bunch is about 200. A young palm may produce as many as five to six bunches per annum, but older palms only produce one or two bunches per annum. Assuming that on an average each palm produces three bunches of fruit per annum, that gives 600 betel nuts per palm per annum. The 600 betel nuts when properly dried and ready for sale, weigh approximately $7\frac{1}{2}$ katis.

As the trees are usually planted eight feet by eight feet on the square system—*i.e.*, 680 to the acre. the yield of prepared betel nuts per acre works out at 51 pikuls per annum.

The present market prices of betel nut are lower than they used to be. Formerly, $6 per pikul was paid, but at present the price varies from $3.50 to $4.50 per pikul. Taking an average price of $4 per pikul throughout the year, this gives a total gross income from betel nuts of about $200 per acre per annum. The total expenses are difficult to obtain but they must be fairly low. For splitting the betel nuts to make "Pinang blah," a cooly gets 8 to 10 cents per pikul of newly gathered betel nuts. When husked and thoroughly dried, this pikul of betel nuts produces about 60 katis of dried and prepared nuts. That is to say, splitting and laying out betel nuts in the sun to make "Pinang blah" costs the owner from 13 cents to 17 cents per pikul. The cost of gathering the betel nuts, packing in sacks, and freight from the plantation to the place where sold is not heavy, so that even at $4.50 per pikul there seems to be a fair margin of profit.

To give an idea of the amount of betel nut produced in the Muar district, the Superintendent of Customs, Muar, informs me that the following are the figures for the amount of betel nut exported from Muar during the last two years:

Years.	Pikuls.
1915	163,997
1916	124,751

Most of this goes to Singapore direct by steamer.

Uses.—The betel nut is extensively used as a masticatory in the East. It has been estimated that one tenth of the whole human family indulge in betel chewing. It is said by those addicted to betel chewing that it strengthens the gums, sweetens the breath and stimulates the digestive organs. Betel nuts are also used in the preparation of certain dyes and as a source of catechu, which is procured by boiling the nuts in water. They are also said to have excellent properties as a vermifuge.

COCONUT TODDY IN CEYLON.

AN interesting paper on the composition of toddy in Ceylon and the changes which take place in this beverage during fermentation has been published recently in the *Journal of the Society of Chemical Industry*, Vol. XXXV, No. 22, 30th November, 1916, by K. C. Browning and C. T. Symons. The main results of this investigation, which are abstracted here, may prove of interest to planters and medical officers in this country.

The authors state that considerable variation occurs in the beverage in Ceylon owing to the variable climate. The toddy industry is a considerable one in Ceylon and provides employment for a large number of people and involves a fairly considerable capital. As the writers state, with the exception of a paper by H. D. Gibbs on the palm alcohol industry in the Philippines (*Philippine Journal of Science*, 1911, Vol. 6, No. 3), no scientific literature giving details of exact analyses of the product, appears to exist, although details in connection with toddy (Tari) from other palms are available—*e.g.*, the Date palm (*Phœnix sylvestris*) the Palmyrah palm (*Borassus flabelliformis*) and the Kitul palm (*Caryota urens*) which are utilized in India for the manufacture of palm sugar, by evaporation of the fresh unfermented juice.

The Ceylon figures are said to be very similar to those of the Philippines and would almost certainly apply generally to the toddy in this country. Details of the method of collection and biological investigations on the nature of the organisms responsible for the fermentation are also included.

Method of Drawing Toddy.

The unopened flower spathe is the part of the plant from which the toddy is obtained. This is prepared by the tapper for a period up to a month before the juice begins to flow.

In preparing a new spathe, this is bruised with a small wooden mallet, carried by the tapper and the spathe bound round with a few strands of fibre to prevent it from opening prematurely.

When the spathe is nearly ready to produce toddy, a small portion of the free end of the spathe is cut off and a chatty (local earthenware pot) is placed on the end; this pot remains in position by its own weight. A spathe which is just coming into flower has its free end considerably higher than the other end, hence any juice flowing from the cut end would trickle down the stem and not into the pot.

In order to obviate this the Sinhalese tappers, when preparing the spathe, gradually bend down the free end, so that by the time the juice flows, it enters the pot attached to the end.

The Cochin tappers who used various bruised leaves to smear the cut end are said to produce the same effect by the use of this greasy or mucilaginous mixture, without bending the spathe.

The application of such leaves is also said to serve another purpose. During the first few days of tapping very little juice flows and when it starts to flow freely, the tapper visits the tree once or twice a day, removes the pot and pours the content into the pot he carries himself. He then shaves off a thin slice from the end of the spathe, taps the end with his mallet and smears the end with the mixture of bruised leaves, etc., and replaces the pot. This application is said to make the juice run more freely by preventing the rapid healing of the wound. The leaves used consist chiefly of cinnamon leaves (*Cinnamomum zeylanicum*), lime (*Calcium hydroxide*) lime (*Citrus*) fruit, wild cinnamon (*Litsoea zeylanica*) shoe flower (*Hibiscus furcatus*) and other species of hibiscus and *Eriodendron anfractuosum* (cotton or kapok tree).

By joining the palms by means of ropes, in order to avoid climbing each palm, a tapper may be able to tap 100 trees per diem, whereas only about 35 could be done by climbing up and down each palm.

Sinhalese tappers are said to be able to tap more, but Cochin tappers to be able to obtain better yields per plant.

Payment is made accordingly to amount of toddy collected. The pots are usually left on the tree for 24 hours before the toddy is collected, even if the spathe has been prepared and cut twice during the day. The above methods of tapping are very ancient and are described by Robert Knox, a captive in the Island for 20 years from 1660.

The yield of toddy per tree varies considerably from different districts of Ceylon but cannot be correlated with any climatic effects.

With one tapping per diem, the average daily yield varies from 600 cubic centimetres on the border of the dry zone to about 1,200 cubic centimetres on the moister coasts and also in some dry inland districts.

With two tappings the daily variation is from 600 cubic centimetres to 3,000 cubic centimetres.

Three tappings per day appear to give better results in some places, where nearly 5,000 cubic centimetres per diem are obtained.

The maxima and minima are also very variable, the greatest maximum recorded being 4,738 cubic centimetres or over a gallon and lowest maximum being 1,100 cubic centimetres. The lowest minimum, exclusive of records taken when a new spathe is started, was about 190 cubic centimetres.

It is generally agreed that the best yield is obtained when the weather is neither very wet nor dry, while along the coast, palms near the sea are said to yield better than those further inland.

Vigorous palms of 20 to 30 years of age are believed to yield best but no rule can be laid down. Very old palms (over 80 years) which have been tapped from year to year yield well.

It is quite usual to tap two spathes on a palm and the average time taken to use up a spathe—*i.e.*, to pare it away, varies from 30 to 90 days depending on the care of the tapper. The total yield per spathe varies from $3\frac{1}{2}$ to $17\frac{1}{2}$ gallons (15–75 litres).

Trees which are being tapped do not give a good yield of nuts on the other spathes.

Uses and Processes of Manufacture.

As is generally well known, coconut toddy is used for three purposes (*a*) the production of crude sugar, (*b*) as a fermented beverage, (*c*) as a potable spirit after fermentation and distillation.

In the production of crude sugar the toddy must be unfermented and fermentation is inhibited usually by placing a small amount of lime (calcium hydroxide) in the collecting pots every day.

It was believed, till recently, that the bark and leaves of certain plants, if placed in the collecting pots would prevent fermentation. The plants used were *Vateria acuminata*, *Cyminosma pedunculata*, and *Garcinia cambogia*. The authors, however, found none of these effectual in preventing fermentation. The first is useful for clearing toddy which is to be made into jaggery (crude sugar) probably owing to the tannin in the bark.

If a new collecting pot is used, the toddy remains unfermented for a considerable time, attributed by the authors partly to salts dissolved from the pot. Tappers state that a new pot must be used for six days before normal fermentation takes place, after the toddy is drawn. In the old pot there is naturally an accumulation of the micro-organisms—yeasts and bacteria—responsible for the fermentation processes and the fermentation is rapid, since the sugary liquid enters drop by drop into a strong culture of yeasts.

The tapping and collecting, except the liming of the pots, is similar, whether toddy is collected fresh for the manufacture of sugar or allowed to ferment.

Manufacture of Crude Sugar.

The liquid (containing lime) is strained and boiled down in large earthenware pots over wood or coconut husk fires till of a syrupy consistency, ascertained by trial; it is then poured into empty coconut shells and allowed to solidify; it varies in colour from nearly white to dark brown and is very deliquescent.

One gallon of toddy yields about $1\frac{1}{2}$ lbs. of jaggery. The sugar is used locally for the preparations of sweatmeats and has a characteristic taste. The industry in jaggery in Ceylon has been of considerable importance in the past, but since the introduction of cheap imported sugar and the increasing demand for copra, the

industry has decreased considerably and there is no record of export during the last few years. The chief source of jaggery for local purposes at present is said to be the Palmyrah palm.

Toddy as a Beverage.

Toddy as a beverage, manufactured from the three previously mentioned palms, is in considerable demand in Ceylon. It is usually brought in the morning and sometimes in the evening also, to the taverns where it is sold by retail. Its composition is somewhat variable, since the fermentation is entirely dependent on chance yeasts and bacteria which make their way into the collecting pot on the tree and for this reason also, it should be treated like similar perishable articles of food and drink—*e.g.*, milk, and cannot be stored.

Although repulsive in odour to Europeans, fresh fermented toddy is quite a refreshing drink. It is not quite clear, but strongly sparkling, since it is still fermenting when consumed.

It should also be a healthly drink, since it contains a large percentage of yeast and may be described as a suspension of yeasts in a liquid containing a certain amount of alcohol, sugar and acid.

It however sours rapidly and the morning's toddy is often not pleasant to drink in the evening, except in cool weather or in the cooler parts of Ceylon where acid production is less rapid. After 24 hours, the liquid is said to be too acid to drink.

Potable Spirit from Toddy.

For the production of a potable spirit—arrack—a considerable amount of toddy is used in Ceylon. The process of distillation is carried out in primitive copper pot-stills heated by wood fires, condensation of the spirit being effected by means of a copper worm immersed in a vat of water, which is not circulated and no rectifiers are used. The resulting spirit is very inferior and is said to be also contaminated with copper. The toddy for the distilleries is placed in barrels which are brought in carts or rolled along the ground. Instead of bringing in sufficient toddy daily to fill the still (100—200 gallons capacity) and distilling as soon as possible, since the alcoholic fermentation is practically complete by the time the toddy reaches the distillery, the liquid is usually kept in open vats for three to four days, by which time it has become very acid and much of the alcohol has been lost. The yield is, therefore, poor and the product inferior.

Approximately, $1\frac{1}{4}$ million gallons of 25° U.P. spirit is made per annum, which is practically all consumed locally.

Vinegar Production.

For the production of vinegar, the toddy is allowed to become sour and is then stored in partially open vats with certain herbs for a considerable time, up to one year. The resulting vinegar is of fair quality and may contain as much as 6 per cent. of acid calculated as acetic acid.

Analytical Details of Toddy.

The following table gives the details of analysis of a number of samples:

	Sp. Gr.	Temp. ° Fah.	Total solids grms. per 100 ccs.	Ash grms. per 100 ccs.	Sucrose, per cent.	Acidity, per cent.	Proteins, per cent.	Alcohol, per cent., by weight.
1. Unfermented...	1.058	86°	15.19	0.33	13.5	0.145	0.32	
2. Slightly fermented ...	1.077	86°	17.22	0.398	10.0	...	0.23	
3. Unfermented...	1.063	80°	16.22	0.185	12.3	...	0.29	
4. Unfermented...	1.060	84°	15.82	0.31	13.75	0.21	0.26	
5. Unfermented...	1.060	84°	16.18	0.31	12.9			
6. Unfermented...	1.061	84.5°	16.28	0.31	12.6			
7. Unfermented...	1.067	85°	19.6	0.33	17.4			
8. Unfermented...	1.065	85°	17.0	0.39	...	0.005		
9. Unfermented...	1.065	84°	17.39	0.41	...	0.05		
10. Unfermented...	1.067	84°	19.68	0.11	17.4	Nil		
11. Fermented ...	1.001	83°	2.43	0.38	...	0.35	...	5.8
12. Fermented ...	1.005	85°	3.36	0.23	...	0.32	...	4.9

Samples Nos. 1, 4, 5 and 6 were collected in sterile glass vessels and sample No. 3 in a sterile earthenware pot.

The above table gives characteristic readings for unfermented, slightly fermented and fermented toddy and represent a few from several thousand determinations.

Changes during Fermentation.

The changes as fermentation proceeds were followed by adding small quantities of yeasts, separated from fermenting toddy by centrifuging, to sterile toddy.

The following table is typical of the fermentation process:

	At start.	Four hours later.	Twenty-four hours later.	In 27½ hours.	In 48 hours.
Sp. gr. at 85 ° F... ...	1.071	1.055	1.013	1.007	—
Alcohol, per cent., by wt.	Nil	1.2	5.85	5.85	6.6
Acidity, per cent., as acetic acid	—	0.16	0.29	0.38	0.43

The following results were obtained for a sample of fresh toddy having sp. gr. 1.069 at 85 ° F and sucrose content 17.0 per cent.:

	In 24 hours.	In 29½ hours.	In 50 hours.
Sp. gr.	1.020	1.010	1.001
Alcohol, per cent., by wt.	5.6	6.6	6.45
Invert sugar equivalent to sucrose, per cent. ...	—	1.0	Nil.

The following results were obtained on another sample having sp. gr. 1.067 at 28 ° C. Total solids, 19.68 grms. per 100 ccs.; sucrose,

17.4 per cent.; and ash, 0.107 per cent.; to which freshly separated toddy yeasts were added.

	In 23 hours.	In 28 hours.	In 47½ hours.	In 52 hours.
Sp. gr. at 28 ° C... ...	1.033	1.020	1.002	1.000
Acidity as acetic acid, per cent.	0.06	0.08	0.16	0.18
Alcohol, per cent., by wt.	4.3	5.3	7.4	7.65

The percentage of alcohol in fermented toddy just prior to distillation varies remarkably, owing to the crude fermentation methods. In one distillery, 92 samples taken during the season showed an alcohol content varying from 8.8 to 2.6 per cent. by weight, the average being about 4 per cent. The acidity calculated as acetic acid was usually under 1 per cent. but within a month, the toddy may contain as much as 6 per cent. of acetic acid.

Sugars.—Sucrose, together with levulose and dextrose, have so far been the only sugars found in fresh toddy. Probably a little raffinose is present. As a rule, one particular source of toddy is said to give a constant yield of sugar. Thus 55 samples from one district in August and September showed a variation in specific gravity from 1.060 to 1.068, the sucrose varying from 15 per cent. to 18.4 per cent., the mean being sp. gr. 1.064, with an average sugar content of 16.9 per cent.

The authors are of opinion that a useful industry could be developed by preparing the sugar and fermenting the residual molasses.

Retail Samples of Toddy.

A large number of samples of toddy from various parts of Ceylon as sold over the counter in toddy-shops and also in the gardens, have been examined. The following are the results from 50 samples:

Specific gravity (average) 1.012 varying from 0.998 to 1.033;

Acidity as acetic acid (average) 0.51 per cent. varying from 0.32 per cent. to 0.67 per cent.;

Alcohol per cent. by wt. (average) 4.2 varying from 2.7 per cent. to 5.8 per cent.

The following figures are given by Gibbs for Philippine coconut toddy:

Average daily yield of sap	600 ccs.	
Annual yield for a good palm	500 litres	
Average specific gravity fresh sap ...	1.070	
Total solids in „ „ ...	17.5	per cent.
Ash „ „ „ ...	0.40	„
Sucrose „ „ „ ...	16.5	„
Invert sugar „ „ „ ...	Trace.	
Acidity „ „ „ ...	Trace.	
Nitrogenous compounds in „ ...	0.60	„

Micro-organisms in Fermented Toddy.

Yeasts.—The following yeasts were isolated at the Alfred Jorgensen Laboratory, Copenhagen, from samples of toddy sent on plugs of cotton wool in sterile tubes.

(1) *Saccharomyces cerevisiæ* or a nearly allied species

(2) A wild *Saccharomyces* resembling a wine yeast. This was a typical wild yeast resembling *S. Ellipsoideus* and fermentation with this yeast was fairly rapid and very complete in a solution containing 16 per cent. sucrose.

(3) *Schizo-saccharomyces* or *fission* yeasts, typical forms resembling *S. S.—mellacei*. Fermentation with these yeasts was slow in starting but gave a good yield.

(4) *Zygo-saccharomyces* or *fission* yeasts resembling *Z. Barberi* but of no interest from the fermentation point of view.

(5) A *saccharomycode* form resembling *S. Ludwigii*.

No species of film forming yeast or *Mycoderma* or *Torula* was found.

Moulds.—The species found belonged almost entirely to the class of moulds which most closely resemble yeasts, such as *Monilia* and *Oidium*.

In the media available in the laboratory, no signs of fructification were obtained, propagation showing itself by budding and fission only.

Bacteria.—Many bacteria were found in the samples and many long chains of bacteria are always present.

The authors conclude that it is probable that many other organisms are present in fresh toddy, which have not survived the journey to Europe.

Adulteration of Toddy.

No statements are made in the paper as to any form of adulteration of the liquid and the variability in alcohol content of what are apparently genuine samples, makes it very difficult, if not impossible, to fix any standard as far as alcohol content is concerned.

In none of the samples examined apparently was the acidity higher than the maximum limit which has been adopted in this country, except in samples which were kept, in order to produce acetic acid by the conversion of the toddy into vinegar.

A suitable method which might be adopted by toddy shopkeepers in this country, in order to prevent acidification in samples of toddy which are not sold within 12 hours after collection, would be to keep the samples on ice, as this would prevent further fermentation. This, of course, can only be done in and near the larger towns where ice is available at a cheap rate.

B. J. EATON.

THE VALUE OF MINERAL PHOSPHATES AS MANURES.

IN view of the fact that mineral phosphates—chiefly Christmas Island phosphate—have been experimented with by the Agricultural Department for manurial purposes, as a source of phosphoric acid, the following conclusions arrived at by G. S. Robertson in a paper on "The solubility of mineral phosphates in citric acid" (*Journal, Society of Chemical Industry*, Vol. XXXV, No. 4, February, 1916), should be of interest.

The method (Wagner's) usually employed to determine the value of the more insoluble phosphatic fertilizers—*e.g.*, basic slag or Thomas phosphate is to determine the amount of phosphoric acid dissolved by extraction with a 2 per cent. citric acid solution. Wagner showed that from 70 per cent. to 95 per cent. of the phosphate in basic slag was soluble in 2 per cent. citric in half an hour and he brought forward the results of field experiments which showed that the returns were proportional to the solubility of the phosphate by this test.

The test was subsequently adopted semi-officially in England and basic slag sold according to the citric acid solubility of the phosphate.

Mineral phosphates have been found to be only slightly soluble under this test and as many agriculturists have accepted the theory that phosphates insoluble in citric acid are of little value to the plant owing to their supposed non-availability, the use of mineral or rock phosphates has been restricted. There is, however, no evidence to support this theory.

According to the author, ground mineral phosphate costs 9*d.* to 11*d.* per unit of phosphate, where basic slag costs 2*s.* per unit, so that the economic importance of the former is obvious, provided its efficiency is proved. The efficiency of mineral phosphate can only be proved by comparative field experiments. Experiments have been made in England during 1911-1913 in which Belgian and Tunisian rock phosphate gave results strictly comparable with the highest citric acid soluble basic slag. In America, rock and mineral phosphates are also stated to be used instead of basic slag.

The author in his experimental work on the solubility of several different rock phosphates shows that, by modifying the test, nearly the whole of the phosphate becomes soluble in a citric acid solution.

By extracting five times with a 2 per cent. citric acid, in the majority of cases from 90 to 100 per cent. of the phosphoric acid was dissolved.

A small amount of free lime or calcium carbonate decreased the solubility considerably. This does not apply to the lime in actual combination with the phosphoric acid.

Fineness of grinding also affects the solubility, the finer the sample, the greater the solubility.

Calcining the phosphate, with one exception, decreases its solubility.

The author concludes that the citric acid test, as ordinarily employed, is useless for valuation purposes for "insoluble" phosphatic fertilizers, and that there can be little doubt that, as a source of phosphoric acid for the plant, rock or mineral phosphates are just as valuable as basic slag.

B. J. EATON

THE PREPARATION OF COMMERCIAL PAPAIN.

Collection of Milk.

THE juice or milk from which papain is prepared, is obtained by making a scratch or shallow incision in the skin of the fruit of the papaw while in a green condition. A bone or wooden knife similar to a paper knife should be employed. The milky fluid exudes rapidly and may be collected in a cup held beneath the fruit. The flow diminishes after a time and the liquid coagulates on the incision; the coagulated liquid is also collected and added to the milk in the cup. The fruit is not removed from the tree and may be tapped several times at intervals of two to three days. No iron knife or utensil should be brought into contact with the milk and the milk should be collected in earthenware or glass vessels, since metals will blacken it.

After collection the milk soon becomes coagulated and should be in the form of a white curd, possessing a pungent, but not putrid smell. It decomposes rapidly if not dried quickly and when decomposed emits a very unpleasant odour.

When considerable quantities are being prepared, the juice should be collected in the early morning and the drying should begin before midday, so that the material is sufficiently dried before evening, to prevent decomposition. Drying can then be continued the following morning.

Drying the Milk.

Drying can be effected in several ways. In hot dry weather, the coagulated milk can be placed on sheets of glass and exposed to the sun, but this is not satisfactory on a large scale and some form of drying apparatus is necessary. Drying can also be effected by spreading the coagulated juice on drying frames made by stretching brown linen on light wooden frames which may be of any suitable size. A small American fruit drier is very satisfactory or a drying stove may be constructed by building, in brick, a chamber about three feet high, three feet wide and six feet long (or of other size to suit the conditions). This chamber is open at the top and, about one foot from the top, the chamber is divided horizontally into two compartments by a sheet of iron, below which a small fire grate is constructed, this lower chamber being connected at the opposite end with a chimney to lead away the smoke from the fire.

In order to obtain an even heat in the upper compartment, a layer of sand, one-two inches deep, should be placed over the iron plate, the frames carrying the coagulated juice are placed on top of this chamber so as to form a lid or cover to the chamber. The heat from the iron plate and layer of sand drives off the moisture at a low

temperature. The temperature should be as low as possible, since over-heating destroys the enzyme which is the active constituent of the papain—a temperature not above 100° F. should be employed if possible.

The substance shrinks considerably during drying, and the contents of several trays may be emptied into one and drying continued. Drying should be continued till the substance is crisp and can be reduced to a fine powder with a pestle and mortar or in a small grinding machine similar to a coffee grinding machine. The powder should be packed in tins or bottles and preserved from contact with the air. It is preferable to warm the powder slightly while grinding. (*Agricultural News, West Indies,* Vol. 1, No. 1, through the *Tropical Agriculturist,* Vol. XLVIII, No. 2, February, 1917.)

NOTE.—The preparation of papain is an important minor industry in Ceylon and in the Philippines and might be developed in Malaya.

B. J. EATON.

NOTE ON LALANG AS A ROOFING MATERIAL.

WITH regard to an article on the utility of lalang as a roofing material which appeared in the *Agricultural Bulletin, Federated Malay States*, Vol. V, No. 4, January, 1917, the manager of an estate in Perak makes the following comments:

"It may be of interest to know that this grass is extensively used on the tea estates of Assam and Eastern Bengal for thatching coolies' quarters, bungalows, etc., also all the native houses in the villages are thatched with it. The well-known Bramapootra thatch is nothing more or less than lalang, which grows to perfection on the river banks, and the right of cutting lalang in these areas is sold by auction by the Government every year in the different districts. This thatch is exported to Bengal, etc., and it was no uncommon sight to see the Planters' Stores and Agency Co. and other firms advertising thatch for sale. It was usual for every estate to have its 'Khane Barrie' lalang patch which was carefully looked after, burnt off after cutting and cattle fed on it for a couple of months, and then the grass was allowed to grow until November, when it was cut down and dried, put up into shooks and stacked like wheat. The usual task was 100 lbs. per cooly a-day. The thatch is put on about 12 inches thick, this generally lasted about five years after which another light covering of thatch was put on the top of the old lot.

"Lalang thatch put on in the right way is an ideal roofing for the tropics, it outlasts the ordinary ataps, is cooler, and is not liable to leak."

REVIEW.

RUBBER COMPANIES' ACCOUNTS by R. S. Stewart, C. A., and F. C. Ebbels.

THIS little booklet (published 1916, by Gee & Co., Ltd., 34. Moorgate Street, London, E.C.) which is the first of its kind, deals exhaustively with the intricacies of the accountancy side of the rubber plantation industry and must have cost its authors considerable time and forethought in its compilation.

While doubtless a large number of managers, agents and others connected with the administration of rubber companies will not see eye to eye with the authors on a number of questions raised or endorse every thing they write, the publication, nevertheless, opening up as it does for discussion the whole question of rubber companies' accounts, is a most useful production and should ably fulfil its intended purpose.

The booklet is one which can safely be recommended to the study of every estate manager, for even though he may have a cut and dried system, either his own or made for him, it is never too late to adopt improvements and there is much to be found in the book of general interest and numerous suggestions that may prove an invaluable help.

MINUTES OF MEETING OF THE PLANTERS' ASSOCIATION OF MALAYA,

held at the Sungei Ujong Club, Seremban, on 28th February, 1917, at 10.30 a.m.

PRESENT:

Mr. R. C. M. Kindersley (*in the Chair*)
„ H. C. E. Zacharias (*Secretary*)

and the following DELEGATES:

From Batang Padang D.P.A.	...	Mr. T. H. B. Phillips
„ Batu Tiga D.P.A.	...	Messrs. G. H. Bennett and H. L. Jarvis
„ Central Perak P.A.	...	Mr. J. S. Ferguson
„ Johore P.A. ...	...	Mr. C. Bradbury
„ Kajang D.P.A. ...	...	Messrs. E. G. Leyne, E. N. T. Cummins and J. H. Linscott
„ Kapar D.P.A. ...	...	Messrs. L. Mooijaart and A. Mahler
„ Klang D.P.A. ...	...	„ Chris. Harrison and E. C. Wakefield
„ Kuala Langat D.P.A.	...	Mr. W. E. Eaton
„ Kuala Lumpur D.P.A.	...	Messrs. F. G. Harvey, F. Clyde Jeavons and F. M. Campell
„ Kuala Selangor D.P.A.	...	Mr. L. A. Irving
„ Negri Sembilan P.A.	...	Messrs. J. Bruce, V. A. Tayler, J. D. McCulloch, A. Burgess, F. J. Heherr, G. W. Hingston, C. Ritchie and W. Buyers
„ Taiping P.A. ...	...	Messrs. A. H. Malet and W. H. Tate
„ Ulu Selangor D.P.A.	...	Mr. W. de L. Brooke

VISITORS—Messrs. K. Browne, R. Gooch, H. Sperling, B. J. Eaton, Norman Thomson, B. Bunting, F. T. Wynyard Wright, G. A. Grant, H. C. Cummins, E. Lonsdale, I. Burgess, G. B. W. Gray, Geo. M. Ure, R. A. B. Adams, F. R. Horn, J. F. Walker and F. F. Phillips.

Before the opening of the meeting, the Secretary reports that the Chairman, Mr. W. Duncan, had written regretting his inability of being present.

Mr. TAYLER then proposes, Mr. FERGUSON seconds, and it is carried unanimously that Mr. Kindersley take the Chair.

1. The Minutes of the meeting held on 27th December, 1916, having been printed and circulated, are taken as read, confirmed and signed.

2.—QUARANTINE STATIONS.

The SECRETARY reports the despatch of the following letter:

"KUALA LUMPUR,
"*4th January, 1917.*

"SIR,

"I have the honour to acknowledge receipt of your letter 4,238 of the 1st of November *re* Quarantine Camp at Port Swettenham and am directed to ask you to thank the Chief Secretary for same.

"My Association regrets that it is at the present moment impossible to give effect to their recommendations but trusts that these suggestions will be kept in view and will be carried into effect when a more favourable time for doing so arrives.

"I have, etc.,
"(Sd.) H. C. E. ZACHARIAS,
"*Secretary.*

"UNDER SECRETARY,
"FEDERATED MALAY STATES,
"KUALA LUMPUR."

He also informs the meeting that the Kapar District Planters' Association had passed a resolution asking when the anti-malarial work at Port Swettenham might be expected to be finished and that this point had been left over from the last meeting.

Mr. MOOIJAART says that he would like to divide his remarks on this subject into two headings:—first, a consideration of anti-malarial works at Port Swettenham, having regard to the quarantine station there, and, second, a consideration of the principle of preventive quarantining, and he would at once like it to be clearly understood that in speaking of quarantine he was throughout speaking of preventive quarantine, that is to say the quarantining of *all* Tamil immigrants in this country as apart from the quarantining of immigrants from a steamer or a locality, known to be infected.

In order to lead up to these points he would like to remind the meeting of a few of the historical facts about Port Swettenham. The port was opened on 15th September, 1901, and it would seem that within two months the official staffs were so decimated by malaria that the High Commissioner instructed by telegram that the port should be closed. These instructions were shortly withdrawn, perhaps influenced by the fact that there was a serious out-break of malaria in Klang at the time, and anti-malarial works were put in hand, and by March, 1902, the port was particularly free of malaria, nor did this disease seriously make its appearance again until December, 1906. This was a remarkable justification of the anti-malarial works carried out, and, since what has been done in the past

can usually be done in the present, he submits that the inference is a fair one that Port Swettenham can be made if not entirely non-malarious at least largely so.

In 1906 he believes that a rush of immigrants caused a breakdown in the machinery at Penang, and that immigration was stopped; if this be so, it must have been at a huge financial loss to the country. In any case it was about this time that it was decided to build another Quarantine Station at Pulau Jerejak to accommodate 6,000 coolies, the existing station only having accommodation for 4,000. This new station seems to have taken some time to build, as it was not opened until 1911. Now the gentlemen present would remember the events of that year, and he would therefore pass it over by describing it as the year of tragedy. It was then decided to build a Quarantine Station at Port Swettenham, and it was then clearly recognized that the bunded area would have to be increased both for the sake of the Quarantine Station and of the town. He believes that in 1912 a scheme of drainage was approved and that a sum of money was voted. The fact, however, remains that the Quarantine Station was opened on the 5th June, 1914, two months before immigration was stopped on account of the war, and that the anti-malarial works are not yet completed.

He believes that the work is now being put in hand, but submits that the planting community cannot be accused of being vexatious if they ask for some definite statement from Government as to when this work will be completed. Under this heading he would, therefore, put the following resolution before the meeting "that the Resident be asked for a definite statement as to when it may be expected that the anti-malarial works at Port Swettenham, on the lines approved in 1912, be completed."

Coming to the second issue, Mr. Mooijaart says that this is a more complex one. As far as he knows, there is no other country in the world where quarantine is carried out as it is here, the new quarantine regulations at the port for Mecca being in no way analogous. He has not been able to find out when or why this principle of preventive quarantine was introduced, but it is comparatively a new measure dating only since about 1911. There seems to be a prevalent idea that it was introduced at the request of the planting community, but he is quite sure that this is not the case. He thinks that this idea may have arisen from the fact that he understands that the planting community did ask in 1911 that, if preventive quarantine was to be carried out, it should be at Port Swettenham rather than at Pulau Jerejak. As a matter of fact he is not at all clear as to whether preventive quarantine is legal; he has been advised that it is not.

He understands that quarantine here is chiefly with a view to prevent the entry into the country of cholera, small-pox, and plague, the latter of which, judging from the annual reports of the health

office and the labour department for the past five years, can be disregarded. Taking the years 1914-1915 as far as he can make out from the above-mentioned reports which are not at all simply written—he might say decidedly abstruse—there was not one case of plague in either Penang or Port Swettenham quarantine station. In 1914, out of 36 ships there were apparently four cases of cholera in Penang and six at Port Swettenham, and in 1915 out of 52 steamers there was not one single case of cholera in either quarantine stations. It must be remembered, however, that during 1914 when there were 10 cases of cholera, four ships were known as being infected, and coolies from these ships would of course in any case have been quarantined.

Dealing with small-pox there was apparently none in either quarantine station in 1914, and in 1915 there was one case in Penang and seven cases at Port Swettenham, only one out of these eight proving fatal. It would seem, therefore, that during the two years under review there were 18 cases of infectious diseases, a considerable number of which were detected on board the steamer. Speaking roughly, he believes that quarantine costs anything between sixty and eighty thousand a year and this gives one pause for thought.

Now it is an axiom of public health that any crowding of people tends towards the spread of disease. There is some reason to believe that coolies have been infected with malaria at Port Swettenham, though we hope that this is a matter which will soon be put right. There is the question of mumps, measles and chicken-pox, and he believes that all of these diseases have developed within the incubation period after discharge from Port Swettenham. The question then that must occur to one is whether we are getting value for our money. He is no D. P. H. and has not taken sufficient advice even to have arrived at a definite personal opinion, but does think that we have sufficient grounds for an enquiry, and one which can in no way be vexatious to Government.

He understands that one of the official difficulties on this side is that of obtaining information from the Indian Government as to the localities which become infected, but surely this is a difficulty which should easily be overcome. He did not wish to elaborate this issue at any great length, though many arguments on the question might be adduced, and would therefore propose "that a Sub-Committee be appointed to enquire into the whole question of the quarantining of cooly immigrants to the Federated Malay States, to confer with the Government departments concerned on the subject and to report the result of their deliberations to the Standing Committee of this Association."

Mr. Wakefield seconds the first proposal, which is put to the meeting and carried unanimously.

Mr. JARVIS then seconds the second motion proposed by Mr. Mooijaart.

Mr. KINDERSLEY agrees with Mr. Mooijaart that there seemed to be no point in having this preventive quarantine. The matter was now open to discussion but before same started he feels he is expressing the wishes of the meeting in thanking Mr. Mooijaart for the great trouble taken by him in going into the subject so thoroughly.

Mr. TAYLER regrets being at variance both with Messrs. Mooijaart and Kindersley. He feels that it would be a most serious thing if they were going to do away with quarantine. Mr. Mooijaart had mentioned a sum of sixty to eighty thousand dollars—a very small amount to pay annually by way of insurance against diseases. Calculated on the Tamil estate population it worked out at less than 50 cents a head. He fails to see how anybody could consider quarantine otherwise but necessary and in every way desirable. He, therefore, saw no need for a committee and would oppose the motion as he felt it would be calamitous if the Association was to express a view that quarantine should be done away with.

Mr. HARRISON hardly thinks that this was a proper subject for the Association to consider but suggests that the attention of the local Medical Association should be drawn to the subject, as it was surely for them to express an opinion on so technical a matter. He begged to propose an amendment that the matter be referred to the local Medical Association.

Mr. TAYLER seconds this proposal.

Mr. PHILLIPS declares himself against this amendment, as the Medical Association met irregularly and at long intervals. Moreover, he understands that it concerned itself more about strictly scientific subjects and professional questions of etiquette.

Mr. JEAVONS supports the original motion and does not think that the appointment of a committee could do any harm. In any case one point which to him seemed the chief was that preventive quarantine was thoroughly distasteful to the immigrant and tended to discourage the free flow of labour into this country.

Mr. IRVING suggests that before going any further it would be a good plan to obtain the opinion of men like Dr. Watson on the subject.

Mr. MALET sees no objection to doctors serving on the committee.

Mr. BROOKE agrees and sees nothing in the wording of the proposal which excludes doctors from sitting on this committee.

Mr. HARRISON withdraws his amendment.

Mr. MOOIJAART intimates in reply to previous speakers that it went without saying that before addressing the meeting he had

obtained the opinion of a number of medical men, including Dr. Watson, also the Senior Health Officer. In fact leading medical men both in this country and elsewhere agreed that purely preventive quarantine was useless. Mr. Tayler did not seem to follow him and appeared to refer to quarantine in general which of course he was the last person to wish to do away with. The only quarantine his motion referred to was preventive, and if medical men considered it to be of no utility it surely was a waste of money to have it. In counting the cost they should not only reckon the actual money expended on it but also the great number of days' work which estates were losing thereby. He also fully endorsed Mr. Jeavons' point that the coolies themselves strongly objected to be detained.

Mr. KINDERSLEY then puts the motion to the meeting and declares it carried by twelve to six, the selection of members of the sub-committee being left to the Standing Committee.

3.—WAR RELIEF.

The SECRETARY reports the receipt of the following contributions, to date as from the 1st of April last:

Batang Padang D.P.A.	$ 617.77
Batu Tiga D.P.A.	2,595.00
Central Perak P.A.	2,154.44
Kajang D.P.A.	1,505.00
Kapar D.P.A.	2,501.70
Klang D.P.A.	5,550.00
Krian District	1,552.95
Kuala Langat D.P.A.	725.00
Kuala Lumpur D.P.A.	1,577.90
Kuala Selangor D.P.A.	2,289.34
Lower Perak P.A.	880.73
Negri Sembilan P.A.	4,052.90
Taiping P.A.	3,542.14
Ulu Selangor D.P.A.	2,618.53
Total F.M.S. ...	32,163.40
Johore	3,057.00
Kedah	790.66
Kelantan	820.39
Penang and Province Wellesley ...	875.77
Grand Total ...	$37,707.22

The SECRETARY reads the following letter from Sir William Tayler:

"88, CANNON STREET,
"LONDON, E.C.
"*11th January, 1917.*

"SIR,

"F.M.S. WAR RELIEF FUND SCHEME—NO. 2.

"I have the honour to refer to my letter to you of the 5th October, 1916.

"With respect to the case of Mrs. ——, that lady wrote on the 26th October last to the effect that she had been granted a pension of £85 by the War Office and this, with the investment of such moneys as had been left by her son, she hoped would bring her an income of £200 a year. She has not applied further.

"Mrs. ——, mother of the late —— of ——, has now obtained a pension from the War Office, and my Committee have authorized a grant of £30 for this year, £15 to be paid on 1st January, and £15 on 1st July.

"Mr. ——, late of —— Estate, was granted a temporary pension of £150 a year from 9th August, 1916, to 17th March, 1917. My Committee supplemented this by a further grant last month of £25 towards his medical expenses, etc., as he is still unable to undertake any work. If he makes further application he is to be examined by Dr. C. W. Daniels before the application is considered.

"Mr. —— had his corporal's pension of 14*s.* 6*d.* a week made up to a lieutenant's pension of £127 10*s.* a year, the difference being paid to him from War Relief Funds. This is all the Committee can do under the regulations of the Johore Government. Mr. —— has expressed himself as very grateful for this. Mr. —— was discharged from the Cambridge Hospital on 1st October, but, unfortunately, his leg gave way, and towards the end of November he was admitted into King George's Hospital, near the Waterloo Station, where he now is. He has been visited two or three times by Mr. Hale and is reported to be doing well.

"Towards the end of October a second grant of £20 was made to Mr. P. Gow for —— formerly of —— Estate for provision of comforts, etc., in St. Thomas's Hospital. Later, Mr. —— made much better progress towards recovery than had been anticipated and was dicharged from hospital in November. Mr. Gow obtained for him a place in the office of Gow, Wilson and Stanton at £3 3*s.* a week and the Committee gave him a sum of £20 for an outfit.

"The Committee had under consideration the cases of Mrs. ——, mother of the late Sergeant ——, formerly a Prison Warder in the Federated Malay States Government Service; of Mrs. ——, mother of the late Corporal ——, formerly an Inspector of Police in the

Federated Malay States, and of Mrs. ——, widow of Lance-Corporal —— formerly a Prison Warder in the Federated Malay States Service.

"Mrs. —— is in receipt of 7*s.* 6*d.* a week from Public Funds and to her the Committee have given an allowance of £2 a month from the 1st October, 1916, to the end of this year.

"Mrs. —— is in receipt of 10*s.* a week from Public Funds and to her the Committee have given an allowance of £3 a month for 12 months from the 1st November, 1916.

"Mrs. —— is in receipt of 15*s.* a week from Army Funds for herself and child. She has also a pension of £40 16*s.* from the Federated Malay States Widows and Orphans Fund; and has employment in the making of munitions. The Committee did not think her case called for relief from the Fund.

"These are, I think, all the cases that have been dealt with to date. The following cases are now under consideration:

"Application from Mrs. ——, widow of the late —— of ——. Mrs. ——'s application says that her husband was resident in the Federated Malay States from February, 1910, to September, 1914, and in Malacca from September, 1914, to July, 1915. He was an Assistant on —— for four months and acting manager of —— for six months.

"Application from Mrs. ——. He was manager of —— Estate. After coming to this country he joined the Royal Flying Corps and has been missing since the 26th August last.

"There is also an application from Mrs. ——, widow of the late —— of the Victoria Institute, who was killed on 4th October, 1916.

"Mrs. —— is in receipt of £124 per annum from Army Funds for herself and child, and Mrs. —— is in receipt of £100 per annum from the same source.

"I am, etc.,

"(Sd.) William Taylor.

"The Secretary,

"Planters' Association of Malaya,

"Kuala Lumpur."

He had been asked to state that the Executive Committee in London was going into every case uninvited and as soon as a casuality list was published they got into touch with relatives and friends to find out whether any financial assistance was required.

Sir William Taylor had informed them that the existence of the Fund was now well known amongst all who had any connection with the Malay Peninsula. As regards any information which

did not appear in the minutes he would, of course, be very pleased to send these privately to any member desiring to have it. As regards the amount so far spent on relief, this was increasing rapidly and there was no doubt about it that the Fund was becoming almost daily of greater and growing importance.

As regards the "Star and Garter Fund," he would report that the $390 referred to on page 9 of the last minutes had been remitted by him to London.

4.—RUBBER THEFTS.

The SECRETARY reports the following correspondence:

"KUALA LUMPUR,
"*28th December, 1916.*

"SIR.

"Referring to your letter 1254, dated the 25th of July, I have the honour to inform you that at a meeting of this Association held yesterday I was instructed to forward to you copy of memorandum (enclosed herewith), which the Standing Committee of this Association on the 7th of December submitted to the Council of the Rubber Growers' Association, London, for further action.

"I have, etc.,
"(Sd.) H. C. E. ZACHARIAS,
"*Secretary.*

"UNDER SECRETARY,
"FEDERATED MALAY STATES,
"KUALA LUMPUR."

RUBBER GROWERS' ASSOCIATION. (INCORPORATED).
"38 EASTCHEAP, LONDON, E.C.
"*11th January, 1917.*

"DEAR SIR,

"I have to acknowledge receipt of your letter dated 7th December covering your Standing Committee's memorandum of rubber and latex thefts. The matter will be brought before the next meeting of my Council, and I will communicate with you again in due course.

"Yours faithfully,
"(Sd.) FRANK G. SMITH,
"*Secretary.*

"THE SECRETARY,
"PLANTER'S ASSOCIATION OF MALAYA,
"FEDERATED MALAY STATES,
"KUALA LUMPUR."

5.—WAR TAXATION.

The SECRETARY reads the following correspondence:

"KUALA LUMPUR,
"*28th December, 1916.*

"SIR,

"I have the honour to inform you that at a meeting of this Association held yesterday the following resolution was passed unanimously:

'While not disapproving of sections 3 to 7 of the draft Enactment on War Taxation, this Association opposes the imposition of an Income Tax, should the draft Enactment in question be brought into force. The Association in any case protests against the tax being applied to only one section of the community.'

and that I was instructed to forward a copy to you.

"I have, etc.,
"(Sd.) H. C. E. ZACHARIAS,
"*Secretary.*

"THE HON'BLE
"THE CHIEF SECRETARY,
"FEDERATED MALAY STATES,
"KUALA LUMPUR."

"KUALA LUMPUR,
"No. 6091/16. "*4th January, 1917.*

"SIR,

"I am directed by the Chief Secretary, Federated Malay States, to acknowledge receipt of your letter of the 28th December, 1916, relating to a resolution passed by the Planters' Association of Malaya on the 27th December, 1916, and to inform you that the recommendation of the Committee on the subject of Income Tax is being considered by the Government.

"I have, etc.,
"(Sd.) S. MCARTHUR,
"*Under Secretary to Government, F.M.S.*

"THE SECRETARY,
"PLANTERS' ASSOCIATION OF MALAYA,
"KUALA LUMPUR."

Mr. KINDERSLEY calls attention to the fact that since their last meeting, the Federated Malay States Government had definitely decided to drop all idea of an Income Tax. It seemed to him therefore proper that Federated Malay States people who thus escaped

this war taxation should at any rate make every effort to invest in the War Loan Investment Trust all that they could possibly spare and thus help materially in the prosecution of the war. He suggests that Constituent Associations would find a great opening in organising in their district the systematic investment of savings in this Trust.

6.—ALIENATION OF LAND TO ALIENS.

The SECRETARY reads the following correspondence :

"KUALA LUMPUR,
"*4th January, 1917.*

"Sir,

"I have the honour to inform you that at a general meeting of this Association held on the 27th ultimo, the following resolution was passed which I was instructed to forward to you—*viz.*

'This Association deprecates the alienation of land in the Federated Malay States to aliens at a time when British capital and superintendence is unavailable for the purpose of opening up such land.'

"I have, etc.,
"(Sd.) H. C. E. ZACHARIAS,
"*Secretary.*

"THE HON'BLE
"THE CHIEF SECRETARY,
"FEDERATED MALAY STATES,
"KUALA LUMPUR."

"KUALA LUMPUR,
"*5th February, 1917.*

"No. 98/17.

"SIR,

"I am directed to acknowledge receipt of your letter of the 4th January, 1917, forwarding a resolution passed at a general meeting of your Association held on the 27th December, 1916, regarding the alienation of land to aliens, and am to inform you that the matter is under consideration.

"I have, etc.,
"(Sd.) W. H. MACKRAY,
"*for Under Secretary to Government, F.M.S.*

"THE SECRETARY,
"PLANTERS' ASSOCIATION OF MALAYA,
"KUALA LUMPUR."

Mr. KINDERSLEY understands that no further land has been given out for rubber planting. This, apparently, was done by an administrative order and was perhaps not unconnected with the representations recently made by the Rubber Growers' Association to the Secretary of State for the Colonies. In any case, as there was nothing official before them, he did not think that anything further could be done at this meeting.

Agreed to.

7.—CURRENCY.

The SECRETARY reports the following correspondence:

"KUALA LUMPUR,
"*18th January, 1917.*

"SIR,

"I have the honour to acknowledge receipt of your letter 7575/15 of the 18th ultimo and to inform you in reply that I am circularizing all our Constituent Associations to discover the amount of half-cent pieces which they are able to put into circulation in their respective districts. As soon as I receive replies from these District Secretaries, I will make the necessary arrangements with the Banks for stocking these coins.

"I have, etc.,
"(Sd.) H. C. E. ZACHARIAS,
"*Secretary.*

"THE HON'BLE
"THE COLONIAL SECRETARY,
"STRAITS SETTLEMENTS,
"SINGAPORE."

"SINGAPORE,
"No. 5757/15. "*26th January, 1917.*

"SIR,

"In continuation of my letter of even number of the 18th December, 1916, I am directed to inform you that $10,000 worth of quarter-cent pieces are now ready for issue.

"2. I am to enquire whether your Association is prepared to take over, on payment, these quarter-cent coins.

"I have, etc.,
"(Sd.) E. C. H. WOLFF,
"*for Colonial Secretary, S.S.*

"THE SECRETARY,
"PLANTERS' ASSOCIATION OF MALAYA,
"KUALA LUMPUR."

"KUALA LUMPUR,
"*2nd February, 1917.*

"SIR,

"I have the honour to acknowledge receipt of your letter 5757/15, dated the 26th ultimo. In my reply of the 18th ultimo to your previous letter I have already informed you that I am endeavouring to make arrangements to have these coins distributed through the Banks.

"In doing so I have been asked whether delivery of the quarter-cent coins can be made here.

"I have, etc.,
"(Sd.) H. C. E. ZACHARIAS,
"*Secretary.*

"THE HON'BLE
"THE COLONIAL SECRETARY,
"STRAITS SETTLEMENTS,
"SINGAPORE."

"SINGAPORE,
"No. 5757/15. "*12th February, 1917.*

"SIR,

"In reply to your letter of the 2nd February, 1917, I am directed to inform you that this Government is not prepared to bear the cost of the transport of the coins in question to Kuala Lumpur.

"2. I am to point out that your letter of the 18th January referred to half-cent pieces, while this office letter of the 26th January referred to quarter-cent coins. The favour of a reply to that letter is requested.

"I have, etc.,
"(Sd.) R. CRICHTON,
"*for Colonial Secretary,*
"*Straits Settlements.*

"THE SECRETARY,
"PLANTERS' ASSOCIATION OF MALAYA,
"KUALA LUMPUR."

LETTER ADDRESSED TO CHARTERED, MERCANTILE AND HONGKONG AND SHANGHAI BANKS.

"KUALA LUMPUR,
"*31st January, 1917.*

"DEAR SIR,

"Reverting to an interview I had with you early last year, I now beg to inform you that the Colonial Government have now $15,000 worth of half-cent pieces and $10,000 worth of quarter-cent pieces ready for issue.

"I have circularized all our Constituent Associations and have, so far, heard that the following quantities are required :

Kapar D.P.A.	...	$25 half-cent pieces monthly
Batu Tiga D.P.A.	...	$50 half-cent and $50 quarter-cent pieces
Kuala Lumpur D.P.A.	...	$105 half-cent pieces monthly.

In addition, Sungei Ular Estate, Kulim, Kedah, requires $25 of half-cent pieces and $2.50 of quarter-cent pieces and Sedenak Estate of Johore $150 of half-cent and $50 of quarter-cent.

"Other replies are still pending, but in the meantime I am to ask whether you will be good enough to make the necessary arrangements for the distribution of these coins.

"Thanking you in anticipation,

"Believe me, etc.,

"(Sd.) H. C. E. ZACHARIAS,

"*Secretary.*"

"CHARTERED BANK OF INDIA, AUSTRALIA AND CHINA,

"KUALA LUMPUR,

"*1st February, 1917.*

"DEAR SIR,

"We are in receipt of your letter of date on the subject of small copper coin.

"Will you please advise us if the coins are to be imported to the Federated Malay States by the Treasurer and whether delivery can be taken from him of such amounts as may be needed by our constituents.

"I have, etc.,

"(Sd.) J. ARGYLL ROBERTSON,

"*Agent.*

"THE SECRETARY,

"PLANTERS' ASSOCIATION OF MALAYA,

"KUALA LUMPUR."

"KUALA LUMPUR,

"*13th February, 1917.*

"DEAR SIR,

"I thank you for your favour of the 1st inst. and in reply beg to say that the Colonial Secretary informs us that the Straits Government is not prepared to bear the cost of transport of the coins in question to Kuala Lumpur.

"Believe me, etc.,

"(Sd.) H. C. E. ZACHARIAS,

"*Secretary.*

"THE AGENT,

"CHARTERED BANK OF INDIA, AUSTRALIA AND CHINA,

"KUALA LUMPUR."

"MERCANTILE BANK OF INDIA, LTD.,
"KUALA LUMPUR,
"*1st February, 1917.*

"DEAR SIR,

"I have to thank you for your letter of 31st ultimo, contents of which I have read with interest.

"2. Should any of my constituents apply for these coins we shall endeavour to meet their requirements, but I should point out that only two estates have so far asked for any and that only to the extent of $10 and $5, respectively, while others have informed me that they will have no use whatever for currency of this description.

"Yours faithfully,
"(Sd.) JOHN FERRIER,
"*Agent.*

"THE SECRETARY,
"PLANTERS' ASSOCIATION OF MALAYA,
"KUALA LUMPUR."

"HONGKONG AND SHANGHAI BANKING CORPORATION,
"KUALA LUMPUR,
"*2nd February, 1917.*

"DEAR SIR,

"I am in receipt of your letter of 31st ultimo and in reply beg to state that we shall do what we can to meet the wishes of our clients in the matter.

"Yours faithfully,
"(Sd.) G. G. S. FORSYTH,
"*Acting Agent.*

"THE SECRETARY,
"PLANTERS' ASSOCIATION OF MALAYA,
"KUALA LUMPUR."

and he also intimates having circularized all Constituent Associations as follows:

"KUALA LUMPUR,
"*4th January, 1917.*

"DEAR SIR,

"Reverting to our request for the coining of half-cent and quarter-cent coins, the Government now inform us that they have carried out our suggestion and that $15,000 worth of half-cent pieces are now ready for issue and that $10,000 worth of quarter-cent pieces are expected shortly.

"As this Association has been pressing for this measure, I trust that all Constituent Associations will do their best to assist in circulating these coins and I shall be glad to hear from you by return as to the quantity of coins that your Association could so circulate each month.

"Thanking you in anticipation for your kind assistance in the matter,

"Believe me, etc.,

"(Sd.) H. C. E. ZACHARIAS,

"*Secretary.*"

The following was the summary of the replies so far received:

	Half-cents.	Quarter-cents.	Remarks.
Kapar	$ 25	$ —	Monthly
Negri Sembilan ...	?	?	
Batu Tiga	50	50	Once
Sedenak Estate ...	150	50	
Sungei Ular Estate	25	2.50	
Kuala Lumpur ...	105	—	
Kuala Selangor ...	25	25	
Klang	19	8	Monthly and $17.50 of each once
	$399	$135.50	

Mr. TAYLER reminds the meeting that they had originally asked for these coins to be delivered as and when required by the Banks and he, therefore, did not see how they could be asked to pay the cost of transport from Singapore. He therefore considers that they should insist on taking over these coins in this manner only—*i.e.*, through their Banks.

Mr. JARVIS draws attention to a severe shortage of small silver coins which had prevailed a short time ago.

Mr. MALET explains that this shortage was due to the exchange which at present made one of their 10 cents coins worth 12½ cents in China and apparently a number of these coins had been shipped by the Chinese to China accordingly, but this export had already been stopped by the Government.

8.—MAN-POWER.

The SECRETARY reports that a meeting had been held on the 16th of January consisting five representatives each of the Federated Malay States Chamber of Mines, the Federated Malay States Chamber of Commerce and the Planters' Association of Malaya

Standing Committee. The following resolution had been passed at this joint meeting and sent to the Under Secretary :

" RESOLUTION.

" That this joint meeting of representatives of the Planters' Association of Malaya, the Federated Malay States Chamber of Commerce and the Federated Malay States Chamber of Mines considers that the present scheme of obtaining men from the Federated Malay States for active service by inviting volunteers is not a satisfactory one, and if the Government does now or may in the future desire to send men from the Federated Malay States on active service outside Malaya, then the Government of the Federated Malay States be asked to register all adult male European British subjects in the Federation and have them examined for fitness for military service, with a view to mobilizing them as and when required for service with the Imperial Forces. In the meantime the representatives urge that steps be taken to prohibit all adult male European British subjects leaving Malaya unless under medical certificate or by special permission of Government. Finally, the Associations here represented invite Government to take advantage of their organizations and co-operation.

" (Sd.) A. K. E. HAMPSHIRE,
" *Chairman of the Meeting.*

" KUALA LUMPUR,
" *16th January, 1917.*"

To this the following reply had been received :

" KUALA LUMPUR,
" No. 279/17. " *22nd January, 1917.*
" Sir,

" I am directed to acknowledge the receipt of your letters dated 12th and 16th January on the subject of the scheme of obtaining men from the Federated Malay States for active service. The resolution passed at the joint meeting of representatives of the Planter's Association of Malaya, the Federated Malay States Chamber of Mines and the Federated Malay States Chamber of Commerce on the 16th instant has been laid before the High Commissioner.

" 2. I am to state that His Excellency is unable to understand how the present scheme can cause a considerable amount of uncertainty and how it can be said to be neither to the interest of the employees nor of the employers.

" 3. In the opinion of the Government the scheme as regards Advisory Committees set forth in the notice issued by the Government is perfectly clear. It gives the employer and the employed the option of seeking the advice of the Committee and it allows of men of military age, who cannot, in the opinion of the Committee, be

spared, obtaining certificates which no doubt they will be glad to have and to show in after-life. It is trusted that all employers will encourage those who are employed by them who are of military age to be medically examined and go before the Advisory Committee but if it is found that employers are putting pressure on their employees not to do so or that men of military age are objecting for other reasons to be examined and take advice, then the Government will be ready to consider whether the wishes of the joint meeting of representatives of the Planter's Association of Malaya, the Federated Malay States Chamber of Mines and the Federated Malay States Chamber of Commerce cannot be met and an Enactment providing for compulsion be passed.

"4. The Government, however, is strongly of opinion that the patriotism of both employers and employed is such that the voluntary system will be found to be sufficient.

"5 His Excellency desires that his thanks may be conveyed to the Federated Malay States Chamber of Commerce, the Planter's Association of Malaya and the Federated Malay States Chamber of Mines for their invitation that the Government should take advantage of their organizations and co-operation.

"I have, etc.,

"(Sd.) M. S. H. McArthur,

"*Under Secretary to Government, F.M.S.*"

The Secretary also tables the official communique issued by the Government on the subject of these Advisory Committees, as published by the *Malay Mail* of 14th January, 1917:

"With reference to the notice recently issued in the Press regarding the appointment of Man-power Advisory Committees in the various Settlements, it has been decided that every man who desires to offer his services for the war should first of all undergo medical examination.

"Applications for medical examination will not be considered from men over the military age limit, which is at present 41.

"For the present, applications for the service will not be considered from men who fail to pass the medical examination class 'A' which is 'fit for active service in any capacity anywhere.'

"Medical Officers have been appointed in Singapore, Penang and Malacca. Applications for the medical examination should be made by volunteers to the Officer Commanding their Corps, and non-volunteers, or by non-residents of Singapore (when visiting Singapore for the purpose of offering their services) to the Staff Officer to the Local Forces, Fort Canning. A printed form will then be given to applicants authorizing the Medical Officer to examine

them. (In Singapore examinations are held at the Drill Hall, on Tuesdays and Fridays at 5.15 p.m., and at Tanglin Military Hospital at 9.30 to 10.30 daily; in Penang and Malacca as arranged between the Medical Officer and the Officer Commanding Volunteers). The necessary particulars will then be filled in by the Medical Officer and the form handed back to the applicant.

"If the applicant is certified to be permanently unfit for any service, he may apply to the Advisory Committee for a formal certificate to that effect, on which the Medical Officer's reasons for rejection will be recorded.

"If the applicant is certified to be fit for service (class 'A'), but is not prepared to prove that he is a free agent, he may apply to the Advisory Committee for his application be enquired into. On the disposal of the case:

"(*a*) He will receive a formal certificate stating that, in the opinion of the Advisory Committee, he can be spared; and if he satisfies the Committee that he is a free agent, this will also be stated, or

"(*b*) He will receive a formal certificate stating that in the opinion of the Advisory Committee:

"(1) He is serving the interests of his country best for the present in his present occupation (reasons to be recorded briefly), or that

"(2) He cannot be spared for the present, but that it should be possible for his employer to replace him by a man ineligible for military service within a certain number of months from date of certificate, or that

"(3) His offer of service should not be accepted for the present, on grounds connected with his dependents.

"If the applicant is certified to be fit for service (class 'A') and is prepared to prove that he is a free agent, his application will be forwaded to Military head-quarters on the prescribed forms ('A'—military and 'B'—private), together with his medical certificate.

"All applicants will be required to volunteer for military service 'in any capacity,' but they may state on their application form ('A' military) whether they wish to offer themselves for training for commissioned service or for Commissions in the Indian Army Reserve of Officers, and the General Officer Commanding will recommend such applications as he may think fit, although candidates should note that his recommendation carries no guarantee of acceptance.

"On receipt of the forms and medical certificate duly filled in and signed, the Staff Officer to the Local Forces will see candidates at Fort Canning on Fridays and Saturdays, between the hours of

9 a.m. and 5 p.m. Candidates for commissioned service will be interviewed by the General Officer Commanding (by arrangement through the S.O.L.F.), on those days. The final decision on each application will rest with the General Officer Commanding, and until such decision has been given no applicant should take for granted that he has been definitely accepted for active service.

"Those in need of an assisted passage to England will, on the recommendation of the General Officer Commanding, be given a letter to the Colonial Secretary, certifiying (i) that the applicant is recommended for military service, (ii) that he has been passed as medically fit (class 'A'), (iii) that he is in need of assistance in the opinion of the General Officer Commanding, and (iv) that he is free to go. This letter will be supported by a copy of his medical certificate, and, where possible, by a written statement from his employer or a certificate from the Committee, both for the retention of the Colonial Secretary.

"On presentation of this letter to the Second Assistant Colonial Secretary, the applicant will be given a letter for presentation to the Steamship Company, who will credit him with £30 towards the cost of his passage.

"The procedure detailed above will not apply in the cases of persons in the service of the Government, or of a Municipality or Harbour Board, who should address their applications to the Colonial Secretary through the heads of their departments.

"Employers are reminded that the Advisory Committees have been appointed by Government for their benefit as well as that of their employees. Certificates will be issued, if desired, by the Committee to an employer stating that in their opinion his staff has been reduced to the mimimum in the circumstances of the moment, that it is not (or is) advisable for him to try and replace any of his able-bodied men who would be otherwise available for military service."

Mr. KINDERSLEY regrets that the Government had not taken the advice tendered by the joint meeting. It would certainly have put everybody very much at ease if compulsory service had been introduced and matters been taken out of the hands of private individuals. The present position was very awkward and he could think of no adequate reason why Government should not have acted on their recommendation. (Applause).

Mr. MCCULLOCH quite concurs with the Chairman's remarks and thinks it a great pity that Government had not adopted the business-like suggestion made by the joint meeting. For one thing it would have prevented the unseemly correspondence which was going on in the local papers. If any proof was needed, surely this

correspondence showed how undesirable and unsatisfactory the present state was. Nobody at the present moment quite knew the peculiar conditions in which others were placed and with their scheme all this mutual distrust and recrimination would have been done away with. He feels that they should not allow matters to rest there and proposes "that this meeting expresses its great regret that the Government has not seen its way to adopt the suggestions put forward by the joint meeting of representatives of the Federated Malay States Chamber of Commerce, the Federated Malay States Chamber of Mines and the Planters' Association of Malaya, held on 16th January, 1917."

Mr. WAKEFIELD has much pleasure in seconding the motion, which is carried unanimously.

The SECRETARY reads the following letter from Messrs. Guthrie & Co., Ltd., Singapore:

"SINGAPORE,
"*15th January, 1917.*

"DEAR SIR,

"With reference to the recent invitation by the Local Military Authorities to fit men, who can be spared, to volunteer for war services at home, we understand it has been suggested that on rubber estates one European for every 1,000 acres is sufficient.

"We believe it is the case that a few years ago the opinion was generally held that there should be one European for every 250 acres—*i.e.*, if the various works necessary were to be properly supervised.

"It will, we think, be appreciated that if a man could not then properly look after more than 250 acres it cannot be the case that he can now properly look after four times that area. Either one or other proposition must admit of considerable modification.

"We suggest that it would be very helpful to all concerned if the Planters' Association of Malaya, would carefully consider the point and state what, in its opinion, on a normal or average estate, is the maximum area which a European should be able to supervise if the work is to be done properly.

"We believe that the considered opinion of a body such as the Planters' Association of Malaya, cannot but carry great weight.

"We are, etc.,
"Per Pro. GUTHRIE & CO., LTD.
"(Sd.) A. E. BADDELEY.

"THE SECRETARY, ...
"PLANTERS' ASSOCIATION OF MALAYA,
"KUALA LUMPUR."

Mr. JARVIS does not think that it was the duty of the Association to give an opinion on the subject. He doubted whether any such general opinion was possible, seeing that the reply depended not only on the district but also on the individual planter. He, therefore, deprecated sending a definite reply to the question asked by Messrs. Guthrie & Co., Ltd.

Mr. BENNETT quite agrees that it was impossible to lay down a hard and fast rule as was desired by the writers of the letter.

The SECRETARY is instructed to reply accordingly.

9.—RUBBER SEEDS.

The SECRETARY reports having been instructed by the Taiping Planters' Association to place on the agenda of this meeting "Rubber seeds cultivation and future seed supply."

Mr. KINDERSLEY suggests that this was hardly a matter for Planters' Association of Malaya meeting but one that ought to be dealt with by the forthcoming Agricultural Conference.

Mr. MALET who had intended to speak on the subject concurs, and agrees to defer his remarks until the Conference in April next.

Mr. PHILLIPS emphasizes the great importance of the matter in view of recently discussed facts and moves that the question of Rubber Seed Cultivation be referred to the Agricultural Conference, as this meeting considers the matter to be of great importance and to require immediate and through investigation.

Mr. MALET seconds the proposal, which is carried unanimously.

10.—NIGHT TELEPHONE SERVICES IN OUTSTATIONS.

The SECRETARY reports that this matter had been placed on the agenda at the request of the Kajang District Planters' Association.

Mr. KINDERSLEY informs the meeting that an all-night service had been introduced sometime ago when gang-robberies were frequent but had latterly been taken off again. His Association had earnestly solicited its re-introduction as there was no doctor in the whole district and as, moreover, all the members of their community were quite isolated. This would be a small matter to the Government but was an highly important one to people living isolated in the country as planters had to do. Klang and Seremban had already an all-night service but it was obvious that such service was really very much more needed in the country than in town. They in Kajang had been given a reply from the Government that they could have an all-night telephone service, provided subscribers paid $1,020 per annum in addition to their present subscription.

Their honorary secretary had since then ascertained that the 71 subscribers on the Kajang exchange were already paying $10,012 per annum for their telephones and it seemed highly unreasonable to ask them to pay still more. After all, it was the duty of the Government to make life secure.

Mr. CUMMINS thinks that the best plan would be for a deputation to go and see the Chief Secretary, as correspondence on the subject had so far not ensured much progress in the matter.

Mr. IRVING reports that in Kuala Selangor they also had had an all-night service for a short period, but since then had been asked to pay $1,200 per annum extra if a continuation was desired. His Association was strongly opposed to any further payment as they looked upon the service as one due to them. He, therefore, would propose that a deputation wait on the Chief Secretary to urge for his consideration the urgent necessity of an all-night telephone service at all outstations.

Mr. MAHLER seconds the proposal, and moves that the deputation consist of Messrs. Kindersley, Irving and Munro.

Mr. PHILLIPS intimates that Sungkai had been promised to be linked up with the trunk line but that nothing had been done so far and quite agrees that it was an urgent matter, which at any time might become of vital importance, to have full telephonic communication everywhere and at all times available.

The proposal is then put to the meeting and passed unanimously.

11.—MOTOR CARS PLYING FOR HIRE.

Mr. MAHLER says that he had asked this subject to be placed on the agenda as his Association considered (*a*) that cars while on the streets plying for hire should not be allowed to refuse to take an intending passenger to any destination; (*b*) that a tariff of fares for hire cars should be fixed by the proper authorities—*viz.*, the Sanitary Board. It seemed illegal to charge more than 24 cents per mile. Yet there was no provision compelling the driver to take a passenger nor to carry a tariff. He was advised, though, that if such a driver was prosecuted he would probably be fined and have his licence cancelled.

Mr. BENNETT queries whether a driver must take one passenger. There surely ought to be some rules defining as to whether the man might wait a reasonable time for more passengers.

Mr. JEAVONS considers it reasonable that a tariff should differentiate rates for one, two, three and four passengers.

Mr. MCCULLOCH is in favour of asking Government to draw up rules analogous to those regulating the traffic of rickshas, etc.

Mr. MAHLER, after consultation with Mr. McCulloch, then proposes "that Government be asked to draw up rules for motor cars on hire analogous to those regulating the traffic of rickshas, etc., and that these rules should include provisions (*a*) that the driver of a motor car which is on the streets or at rest in a park, plying for hire, be not allowed to refuse to take an intending passenger at any time to any reasonable distance; (*b*) that all motor cars plying for hire be obliged to carry a tariff of fares."

Mr. IRVING seconds the proposal, which is carried unanimously.

12.—NOMINATIONS FOR CHAIR.

The SECRETARY reports that Mr. Duncan had informed him that he did not desire to stand again for the Chair as he intended to leave the country in April. He had received, so far, the nomination of Mr. R. C. M. Kindersley, from the Kuala Lumpur, Kapar, and Kuala Langat Associations, whilst Mr. J. D. McCulloch had been nominated by the Taiping and Batang Padang Associations. He reminds the meeting that all nominations should reach him on or before the 15th March.

Mr. MCCULLOCH regrets to say that he was unable, on account of pressure of work, to stand as Chairman for 1917–18.

14.—COURT PROCEDURE.

The SECRETARY reads the following correspondence:

"MIDLANDS ESTATE,
"KLANG,
"*December, 1916.*

"SIR,

"I have the honour to submit for your consideration the following facts:

"A cooly named Irisen, on Midland's Estate, seriously damaged a number of trees by grossly careless tapping. He had previously been employed on Highlands Estate as a tapper for about two years, and was stated to be an experienced tapper.

"On 15th instant, after previous warnings, he was found to have done further considerable damage to the trees.

"On 16th instant, the cooly did not turn out to muster and left the estate without leave.

"On his return to the estate on 18th, he was arrested and charged in the Klang Court under sections 234 and 229 (*c*) of the Labour Code. The Assistant Controller of Labour appeared at the hearing and made various statements (not on oath and none of which are recorded in the Magistrate's notes) generally as to the knowledge

necessary for various systems of tapping and stated as a fact that in this particular case the cooly was inexperienced in tapping as carried out on Midlands and that the damage was not due to carelessness. Subsequently, the Assistant Controller of Labour admitted, out of Court, he knew nothing about different systems of tapping. Surely, it is no part of the Assistant Controller of Labour's duties to give evidence from the body of the Court upon such a matter as tapping.

"The Assistant Controller of Labour further influenced the Magistrate by informing him that the cooly was justified in leaving the estate at any time without informing the manager or obtaining any consent, provided the reason was he wished to go to the Labour Office.

"The result of these cases was that the cooly was cautioned and discharged on both charges.

"Subsequent to the case the Assistant Controller of Labour informed the assistant manager that if the cooly was a bad tapper he should be employed on field work.

"On the day following the case, the 19th instant, the cooly did not turn to work at all.

"On the 20th, the cooly turned to muster but immediately returned to the lines and was subsequently ordered by the assistant manager to do field work. This he refused to do, and again left the estate.

"On the 21st, he was again charged before the Klang Court with refusing to work under section 229 (*c*). The Assistant Controller of Labour on this occasion was sitting as Magistrate and would have proceeded to hear the case had such a course not been objected to on behalf of the prosecution. The Assistant Controller of Labour had already interviewed this cooly in his office in addition to having appeared on his behalf in the previous case.

"On the 22nd, the case was heard before another Magistrate and the Assistant Controller of Labour again appeared on behalf of the cooly and cross-examined the assistant manager with a view to showing that the cooly was engaged as a tapper and not for field work and that the cooly was justified in refusing to do field work. The Magistrate thereupon discharged the accused. The cooly is, therefore, unfit to tap and cannot be made to do other work, and can thus set the orders of the manager at defiance.

"Since the date of the last case the cooly has not returned to the estate. It is known, however, that he has been to the Labour Office and is at present staying on a neighbouring estate.

"It appears, however, to be quite useless to bring this cooly again before the Court on a charge of bolting.

"A further case is that of a cooly named Alagan. He was charged on the 18th instant before the Klang Magistrate for an offence under section 229 (*a*) for having absented himself from work on 11th, 13th and 15th instants without leave. The cooly stated in his evidence that he had given notice on 1st instant to leave the estate and that on two of the days he was absent he went to the Labour Office. The Magistrate dismissed the case and ordered the assistant manager to pay off the cooly on 1st January, notwithstanding the assistant manager's sworn evidence that the cooly had not in fact given notice. The Magistrate does not record this order. The Magistrate in giving such a decision was undoubtedly influenced by the Assistant Controller of Labour who appeared in this case also on behalf of the cooly. The Assistant Controller of Labour informed the Magistrate that no proper record was kept as to when coolies gave notice so that managers could say at the end of the month that they had no recollection of the cooly giving notice. This is absolutely untrue as far as Midlands Estate is concerned. The Assistant Controller of Labour further said publicly in Court that he would not accept the assistant manager's word that the accused had not given notice as against that of the cooly. It is for the Magistrate, not for the Assistant Controller of Labour, to decide upon the veracity of the witness.

"The Assistant Controller of Labour further informed the Magistrate that a cooly coming into the Labour Office on two days without previously reporting to the manager and at any time of the day was sufficient excuse for not turning out to work at all; and further that it was inconvenient for him to see coolies in the afternoon; notwithstanding on a previous occasion the Assistant Controller of Labour informed the manager that coolies who wished to see him should come after they had finished their morning work.

"The above facts and the general attitude of the Assistant Controller of Labour in connection with the above proceedings leaves no doubt that he is desirous of hampering in every possible way the good management and proper control of this estate.

"Managers are not permitted to punish the coolies themselves by fine or otherwise and they can only bring cases before the Court to be dealt with by the Magistrate. While, of course, agreeing that the coolies so brought before the Court should have full justice given to them in every way, and if thought desirable in any way for the Assistant Controller of Labour to attend and be heard, it is submitted that the Assistant Controller of Labour is acting a wrongful way in putting every obstacle in the way of a cooly being punished for offences committed and attempting to influence the Magistrate to discharge accused coolies on technical points by putting forward misleading statements.

"It is further submitted that it is not desirable that an Assistant Controller of Labour should be hearing coolies' complaints in his office one day and then subsequently sitting as a Magistrate to adjudicate in cases connected with those complaints.

"As I read the Code, the object is to make for the good management of estates while protecting the managers and coolies from any injustice.

"(Sd.) C. R. HARRISON.

"THE CONTROLLER OF LABOUR,
"KUALA LUMPUR."

"No. (7) in 3/1917.

"OFFICE OF THE CONTROLLER OF LABOUR,
"KUALA LUMPUR, *14th February, 1917.*

"SIR,

"I have the honour to reply to your letter which I acknowledged on the 3rd January ultimo, which you asked that steps might be taken to obviate the 'existing evil in this (Klang) district due to either the Assistant Controller of Labour's mistaken ideas as to his duties or to his personal prejudices.'

"2. I have obtained copies of the notes of the Magistrates who heard cases 3,129 and 3,156 of 1916, in which Irisen was accused, and case 3,130 of 1916 in which Alagan was accused; I have also obtained a report from the Assistant Controller of Labour upon the circumstances of the cases, and the Assistant Controller of Labour has replied to certain questions which I put to him arising out of the statements made in your letter.

"3. I have given much consideration to these documents and can find no justification for your remark that the Assistant Controller of Labour is undoubtedly desirous of hampering in every possible way the good management and proper control of Midlands Estate. Nor does it appear to me that the Assistant Controller of Labour has mistaken ideas as to his duties. On the contrary, it appears to me that in endeavouring to procure the acquittal of Irisen and Alagan he acted properly.

"4. The Assistant Controller of Labour was permitted by the Court to make certain remarks to which exception is taken in your letter. Objections to the procedure of the Court should be addressed to another quarter.

"5. Some comment appears necessary regarding your statement that the Assistant Controller of Labour informed the Magistrate 'that it was inconvenient for him to see coolies in the afternoon

notwithstanding that on a previous occasion the Assistant Controller of Labour informed the manager that coolies who wished to see him should come after they had finished their morning work.' The Assistant Controller of Labour states that he believes he informed you in his office that it was more convenient for cooly complaints to be attended to after the hour of noon as by that time the official mail would have been dealt with, and also that it would, he knew, be more convenient to managers if coolies came in the afternoon after finishing their work. He did not mean you to think that no cooly's complaint will be attended to before 12 noon.

"I have, etc.,

"(Sd.) J. R. O. ALDWORTH,
"*Controller of Labour, F.M.S.*

"THE MANAGER,
"MIDLANDS ESTATE,
"KLANG."

"MIDLANDS ESTATE,
"KLANG,
"*24th February, 1917.*

"SIR,

"I have the honour to acknowledge the receipt of your letter of the 14th instant and at once take the opportunity of correcting a clerical error in my previous letter and which is quoted in the 3rd paragraph of your letter. The sentence was intended to and should read as follows:

> 'The above facts and the general attitude of the Assistant Controller of Labour in connection with the above proceedings leaves no doubt that he is desirous of hampering me in every possible way in the maintenance of proper control on this estate.'

"I note that you are of opinion that the Assistant Controller of Labour has acted properly in endeavouring to procure the acquittal of Irisen and Alagan in the cases referred to. If it is your opinion that the Assistant Controller of Labour should endeavour to procure the acquittal of a cooly who committed an offence under the Code then I regret having troubled you in the matter, I should have submitted my complaint to another quarter.

"I am advised that the offence charged against Irisen and heard on the 22nd December, was duly proved and that the Magistrate's technical interpretation of the law was wrong, it was upon this that the accused was acquitted.

"I cannot believe that either the Assistant Controller of Labour or yourself having knowledge of the facts of the case can suggest that this cooly agreement was for the performance of any specified piece of work.

"With reference to paragraph four of your letter the Assistant Controller of Labour is himself a Magistrate and should therefore be all the more careful not to adopt a procedure in Court which an inexperienced planter may not know to be wrong. Because the Magistrate allowed that which was improper this does not appear to be a good reason for the Assistant Controller of Labour doing what was improper.

"With regard to the last paragraph of your letter I have nothing to add to my previous letter.

"I am submitting this correspondence to the District Planters' Association at their next meeting.

"I have, etc.,

"(Sd.) C. R. HARRISON.

"TO THE CONTROLLER OF LABOUR,

"KUALA LUMPUR."

CASES TAKEN IN THE KLANG COURT BY SUNGEI WAY ESTATE.

CASE No. 1.

"Klang Court Case, No. 1,872/1915.

"*20th December, 1915.*"

"Two coolies, Periakka and Pitchai, were charged with absconding from the service of Sungei Way Estate.

"The case was taken by the Assistant Controller of Labour at 10.5 a.m. and dismissed.

The following remarks appear in the Magistrate's book:

"Discharged. Nobody present to prosecute."

My assistant, Mr. Orr, was delayed and arrived at the Court at 10.12 a.m., having to come some 14 miles to attend Court and was told that the case had been dismissed. I may say here that it is most unusual for the Magistrate to sit at 10 a.m. sharp and 10.15 a.m. and 10.30 a.m. are nearer the usual time. The Magistrate could quite well have held the case over for half an hour or so. Mr. Orr applied for a fresh warrant, but this the Assistant Controller of Labour refused to sign. The two coolies in question were ordered to return to the estate, which they did and bolted again the next day. One of them was caught again and given three weeks' imprisonment by Mr. Goldthorp on 23rd December, 1915.

"Mr. Orr complains that the Assistant Controller of Labour's demeanour was lacking in courtesy. The Assistant Controller of Labour's attitude in refusing to issue a new warrant was, I afterwards discovered, quite illegal, as the Magistrate's discharge of the coolies did not amount to an acquittal."

CASE No. 2.

"Court Case, No. 3,146/1916.

"*21st December, 1916.*

Before the Assistant Controller of Labour, Magistrate, Klang.

"A cooly, named Alagerisamy, was charged with attempting to induce two coolies, Perumal and Alagan, to leave Sungei Way Estate with him for better pay and go to an estate near Ipoh.

"Both witnesses insisted that Alagerisamy tried to induce them to leave the estate.

"Alagerisamy, without witnesses, pleaded not guilty and was discharged, and the Assistant Controller of Labour ordered the estate to pay Alagerisamy $5 compensation for bringing a frivolous charge.

"During the hearing of the case, Alagerisamy complained that he had been detained two days on the estate and was told by the Magistrate that he could take a case against the estate for such detention.

"To say that the charge is frivolous was nothing short of a direct insult, as I was very careful to make certain of my facts before taking up the case and this is the reason why the cooly (who had been paid off a month previously and returned to the estate) was detained for two days.

"Throughout the case, Mr. Orr says that the Magistrate left the impression that he believed the cooly's word in preference to that of himself.

"I take no exception to the dismissal of the case, but I submit that the Assistant Controller of Labour committed a grave injustice in describing the charge as a 'frivolous' one.

"(Sd.) W. S. REEVE-TUCKER."

"OPINION.

"I have read the annexed notes of evidence in Klang Criminal cases, Nos. 3,129 and 3,130 of 1916, and also the correspondence between the manager of Midlands Estate and the Controller of Labour thereon.

"The first charge against the cooly named Irisen was made under section 234 of the Labour Code—*viz.*, that he absented himself from his employment without reasonable excuse during working hours.

"It was admitted and proved that the cooly was absent from his employment from 7 a.m. on the 16th December until sometime during the morning of the 17th. The onus was therefore thrown upon the cooly to prove he had reasonable excuse. His excuse was

that the assistant manager told him to return to Highlands Estate where he had been previously employed. This was denied by Mr. Bousfield. The cooly further stated that he had been advised to go to Highlands Estate by a kangany on Midlands Estate. The Magistrate cautioned and discharged the accused. This, theoretically, amounts to a conviction and shows that the Magistrate did not think the cooly had reasonable excuse for absenting himself from his employment.

"Having regard to this it is difficult to understand the view expressed by the Controller of Labour in his letter of the 14th February—*viz.*, that he approved the Assistant Controller of Labour's action in endeavouring to procure the acquittal Irisen.

"With reference to this charge I would draw attention to what appears to be *prima facie* conflicting sections of the Code and which might possibly be differently framed with advantage.

"Section 99 (i) provides that no labourer shall be bound to work on more than six days in one week.

"Section 231 provides that any labourer who shall without reasonable excuse neglect to do as required at least 20 days work in any one month is guilty of an offence.

"Section 234 provides that a labourer who is absent from his employment without reasonable excuse during working hours is guilty of an offence.

"Section 229 (*a*) provides that every labourer who shall without reasonable excuse to be allowed by the Court neglect to attend at the time or place arranged to commence or carry on any work is guilty of an offence.

"It will be seen from the above sections that in no case is it an offence for a cooly to leave his place of employment without first obtaining the consent of the employer or even reporting to him provided he can subsequently furnish 'a reasonable excuse.' What is a reasonable excuse is not defined by the Code and must be determined by the Court in each case. Section 236 only provides that certain circumstances may be deemed to afford 'reasonable excuse.'

"The second charge against Irisen was made under section 229 (*a*)—*viz.*, that he was guilty of carelessness in the custody of his employer's property.

"The evidence of Mr. Bousfield was to the effect that the cooly had wounded some 300 trees by careless tapping. Here again the Magistrate must have considered the offence proved because he again cautioned the accused and discharged him. The Magistrate in giving his reasons for so dealing with the case stated that the cooly should have been stopped from tapping.

"Notwithstanding that the offence was proved under this charge Mr. Aldworth expresses the same view as above stated—*viz.*, that the Assistant Controller of Labour was right in endeavouring to procure the acquittal of the cooly.

"With regard to the third charge brought against Irisen on the 22nd December, 1916, this was made under section 299 (*a*)—*viz.*, that the cooly had neglected to fulfil his contract. In consequence of the damage done by this cooly to certain trees by careless tapping and in view of the remarks made by the Magistrate in the previous case the cooly was stopped tapping and ordered to do field work. This he refused to do. The Magistrate held the cooly had committed no offence inasmuch as the cooly had been engaged as a tapper, that he could not be put on to other kind of work and that his agreement could only be terminated by one month's notice under section 68 (i) of the Code.

"I am of opinion that the decision of the Magistrate in this case was wrong. The evidence did not disclose the fact that the cooly was employed for any specified piece of work. The evidence only shows that it was intended that the cooly should be employed as a tapper. Section 68 (i) reads 'an agreement may be entered into for any period not exceeding one month *or* for any number of days not exceeding thirty *or for the performance of any specified piece of work.*' The cooly in question appears to have been engaged as an ordinary labourer. The definition of 'labourer' is 'an Asiatic employed for the purpose of personally performing *any* manual labour.' There was no suggestion made by the cooly that he had been employed for any specified *piece* of work.

"With regard to the case against Alagan, Criminal Case No. 3,130 of 1916. This case is somewhat different to the case already mentioned. He was charged under section 229 (*a*) for having absented himself from work on the 11th, 13th, 15th December without reasonable excuse. The excuse given was that he wished to make complaints to the Assistant Controller of Labour. If Mr. Bousfield's evidence is to be believed the complaints were without foundation. If the cooly's evidence was to be believed then he would appear to have had reasonable excuse for absenting himself. The Magistrate accepted the story of the cooly and dismissed the case.

"Upon the papers submitted to me the further question arises as to the Assistant Controller of Labour's legal position so far as his efforts were concerned to obtain acquittals in the above cases.

"Section 242 of the Code states that the Controller shall have the right to appear and be heard before all inferior Courts in any proceedings under the Enactment.

"The wording of this section is not as definite and clear as it might be. It has been construed by the Magistrate at Klang as giving to the Controller similar powers as those enjoyed by Counsel. The

Controller can of course always give evidence in a case in the same manner as an ordinary witness. I do not think it desirable, however, that the Controller should combine the two offices at one hearing. If the Controller wishes to give evidence he should do so on oath in the ordinary way and be available for cross-examination purposes. This I understand was not done during the hearing of one of the cases against Irisen.

"Dated this 20th day of February, 1917.

"(Sd.) P. BARNARD FORD."

Mr. HARRISON further explains the subject matter and maintains that it seemed to him altogether wrong for the Assistant Controller of Labour to endeavour to obtain the acquittal of a cooly who had been guilty of an offence. Another point was surely that a cooly could be transferred from one type of work to another and, thirdly, it seemed quite wrong for the Assistant Controller of Labour to sit as a Magistrate.

The Klang District Planter's Association had asked him to propose the following motion:

> "That it is not desirable that the Assistant Controller of Labour should sit as a Magistrate in labour cases where there is a possibility of his having previously heard coolies' complaints connected with cases subsequently brought to Court."

He would add that it seemed to him desirable that the correspondence as read out should be forwarded to the Chief Secretary, together with the resolution.

Mr. BENNETT seconds the resolution.

Mr. TAYLER thinks it well to refer to the notorious Linsum case *re* a tapper doing weeding work before any action was taken.

Mr. JARVIS agrees that it was inadvisable for the Controller of Labour to sit on the Bench.

Mr. KINDERSLEY thinks it wise to defer the matter until their next meeting, and in the meantime, they had better investigate all the points involved.

Mr. JEAVONS agrees that it was impossible for a public meeting to weigh the evidence and as their resolution meant a complete alteration of the law it seemed to him absolutely necessary that there should be some preliminary investigation before they committed themselves to any course of action. He would, therefore, propose that the whole matter be referred to the Standing Committee with instructions to submit a report at their next meeting.

Mr. HARRISON having withdrawn his proposal.

Mr. IRVING seconds the motion proposed by Mr. Jeavons, and this is carried unanimously.

14.—MEETINGS.

Mr. PHILLIPS invites the Association to hold their June meeting at Sungkai. Reference to the railway time table would show that Sungkai offered greater advantages in time to the general body of delegates than many other planting centres and it would give his Association the greatest pleasure to entertain the delegates.

Mr. KINDERSLEY thanks the Batang Padang Association for their kind invitation which the Association would have great pleasure in accepting.

The meeting terminates at 1 p.m.

H. C. E. ZACHARIAS,
Secretary.

Exports of Rubber from British Malaya (other than F.M.S.).

State.	Month.	Quantity.
		lbs.
Johore	December...	3,092,050
Kelantan	„	237,564
Kedah	November and December	1,768,571
Perlis	December	3,292
British N. Borneo ...	„	395,052
Brunei	„	15,204

Abstract of Meteorological Readings in the various Districts of Malaya for the month of December, 1916.

District.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Maximum.	Minimum.	Range.	Mean Wet Bulb.	Vapour Tension.	Dew Point.	Humidity.			
Kelantan, Kota Bharu	...	107.2	77.1	84.83	71.67	13.16	72.8	.728	69.8	78.	...	24.91	5.95
Pahang, Kuala Lipis	...	...	78.1	85.4	71.4	14.	74.5	...	...	...	...	6.78	.98
Johore, Johore Bharu	...	...	...	85.58	72.74	12.84	...	...	...	...	...	8.18	
Singapore, Kandang Kerbau ...	29.760	158.	80.3	86.3	73.4	13.1	76.1	.839	...	81.	...	9.10	2.33
Malacca, Durian Daun ...	29.801	138.5	81.3	85.3	71.1	14.2	78.2	.922	...	85.	N.E.	4.88	2.01
Negri Sembilan, Seremban ...	...	147.4	85.3	89.6	72.6	17.0	74.6	.782	72.7	80.4	N.W.	3.82	1.20
„ Kuala Pilah ...	...	135.2	80.3	89.1	70.7	18.4	77.3	.884	75.2	85.3	...	3.17	.98
„ Port Dickson...	...	122.2	80.5	86.3	73.0	13.2	76.4	.827	74.2	79.4	...	6.25	2.42
Selangor, Kuala Lumpur ...	29.756	151.6	79.7	67.5	72.1	15.4	75.8	.819	75.5	80.	N.E.	6.00	2.29
„ Klang	...	...	79.2	85.5	71.4	11.0	75.9	...	...	...	...	7.07	1.65
„ Kuala Selangor ...	...	...	...	85.9	75.8	12.1	...	...	...	...	...	6.99	2.18
„ Rawang	...	...	...	90.9	...	...	...	...	...	...	...	7.27	2.24
Perak, Telok Anson	...	...	79.88	90.	69.	21.	76.48	.866	...	87.	...	5.15	1.14
„ Ipoh	...	...	80.28	91.	68.	23.	75.26	.808	73.13	78.	...	6.53	1.61
„ Taiping	...	112.	79.26	90.	68.	22.	75.54	.835	...	84.	...	14.52	7.63
„ The Cottage	...	...	...	...	...	...	...	...	...	...	...	21.57	3.34
„ Parit Buntar	...	...	81.11	91.	63.	28.	76.40	.848	...	80.	...	2.48	1.10
Penang Georgetown	29.839	146.5	82.2	87.3	73.	14.3	76.1	.820	72.1	75.	N.W.	1.52	.50
Kedah, Alor Star	...	...	...	...	...	...	...	...	...	...	...	5.86	
Perlis, Perlis	...	...	...	83.41	70.77	12.64	...	...	...	...	...	6.04	